DURBAN UNIVERSITY OF TECHNOLOGY

WATER RESOURCE MANAGEMENT FOR SUBSISTENCE FARMING IN WARD 19 OF KWAZULU-NATAL

OLAYEMI RAHMAN BAKRE

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WATER RESOURCE MANAGEMENT FOR SUBSISTENCE FARMING IN WARD 19 OF KWAZULU-NATAL

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Olayemi Rahman BAKRE

21243119

Approved for final submission:

Supervisor: _____ Date: _____

Prof Nirmala Dorasamy

Co-supervisor: _____ Date: _____

Dr Ivan Gunass Govender

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ABSTRACT

South African rural areas are amongst the poorest in the world, as there is still a wide gap in terms of development with their urban neighbours. With an estimated 6.4 million South Africans falling below the national poverty line in 2010, KwaZulu-Natal (KZN) remains the province with the highest number of poor people. The majority of rural dwellers in South Africa and KZN rely on subsistence farming, while others depend on government grants or family members living and working in urban areas to sustain a living. However, the income received is often insufficient to cater for their daily needs. In consonance with the high prevalence of poverty and the stagnation of subsistence farming, this study aims to examine the role of water supply in rural agricultural development in the Ward 19 area of Mtubatuba Municipality, which is situated along the north eastern region of KZN. To accomplish this aim, a mixed research approach with elements of qualitative (interviews) and quantitative (questionnaire) research techniques was used to obtain relevant information. A total of 50 participants took part in this study, all of whom were subsistence farmers in Ward 19 of Mtubatuba Municipality in KwaZulu-Natal. Furthermore, interviews were conducted with three senior officials from the regional office of the Department of Water Affairs in Durban; three staff members from the Mtubatuba Municipality; two individuals from Ward 19; two senior staff members from the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba; as well as two senior staff members from Umkanyakude water services provider in Mtubatuba.

The study revealed that water shortages have adversely undermined the development and growth of subsistence farming in this poor community. Furthermore, the difficulties experienced by the marginalised people of Ward 19 are typical of many rural areas which have not fully benefitted from transformation in a post-apartheid South Africa. In order to address the defunct subsistence

farming in this community, the study proposed a well-tailored and effective water resource management approach with the intention of transforming subsistence farming into commercial farming, thus improving the standard of living and reducing poverty to a reasonable level. Furthermore, in recognition that the area under study is dominated by women, the study emphasised the imperativeness of empowering the women of the community as a strategy underpinning rural development.

DECLARATION

I hereby declare that the work (described) in this thesis is my original work and has not previously been submitted in its entirety or in part for a degree at any other university. I further declare that this work does not infringe or violate the rights of others, as all the sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references.

Olayemi Rahman Bakre

DEDICATION

To Allah

The Lord of unfathomable qualities who had made this research a reality

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Chapter 1: Introduction and background of the study

1.1 Introduction

Water availability is on the decline and is forecasted to worsen with the passage of time. Water shortages are likely to spread due to increasing demands from unabated population growth, unsustainable withdrawal, development pressure on land and water, the prevalence and spread of invasive alien plant species, difficulty in finding new supplies; and changing climatic and precipitation patterns (Herold 2009: 5-8; Diouf 2007: 7).

Water plays an overarching role in rural development and the growth of subsistence farming (Aliber and Hart 2010: 23; Bhatti, Koike and Nasu 2012: 2). Subsistence farming often thrives in regions having sufficient water for agricultural purposes. However, this is not the scenario in the Ward 19 area of Mtubatuba Municipality as it is characterised by erratic rainfall and semi-arid soil (MacVicar, Loxton, Lambrechts, Roux, Villiers, Verster, Merryweather, Rooyen and Harmse 2013: 2-3).

In light of these issues, water resource management is imperative for the optimal use of limited water resources in the most productive manner which could accelerate rural development and better standards of living conditions amongst rural subsistence farmers, hence taking them out of the poverty cycle in the long run (Jayne, Mather and Mghenyi 2010: 14; Jagals 2012: 18; Baiphethi and Jacobs 2009: 9).

This chapter provides an overview of water resource management and importance of rural development and subsistence farming within the South African rural context. It highlights the research problems and aim, as well as the objectives of the study. The significance of the study, methodology, scope and limitation are discussed. It also provides the structure of the dissertation.

1.2 Background to the study

South African rural areas are among the poorest in the world as there is still a wide gap in terms of development with their urban neighbours (Westaway 2010: 11; Seekings 2010: 5-7). The majority of rural dwellers in South Africa rely on subsistence farming, whilst others depend on government grants or family members living and working in urban areas to sustain a living. The income received from family members in urban areas is often insufficient to cater for their daily needs. The homeland of KwaZulu comprises 44 diminutive and separate pockets of land which came into being in March 1972, some of which are still characterised by poverty and overcrowding (Allen and Brennan 2004: 47).With an estimated 6.4 million South Africans falling below the national poverty line in 2010, KwaZulu-Natal (KZN) remains the province with the largest number of poor people (Schwabe 2010: 58).

Ward 19 is a rural settlement located within the Mtubatuba Municipality. As evidenced by Mr. C.V Mkhwanazi (Councillor to Ward 19), Ward 19 is the largest ward in South Africa and amongst the most poverty stricken communities in the country. The difficulties experienced by the marginalised people of Ward 19 are typical of many rural areas which have not fully benefitted from transformation in post-apartheid South Africa. Attempts have been made to address poverty and inadequate development in the ward. One such attempt is the Hlaneni Landscape project. To foster development, a community leader approached the Department of Agriculture, Environmental Affairs and Rural Development with a proposal to promote subsistence farming, and the plan contained in the proposal has been supported by the department for the last four years. This agricultural project, managed by 20 women, has potential for growth and development. However, it is constrained by water shortages, as the farm depends mainly on rainfall, which is irregular.

Water is indispensable for life, agricultural and industrial activities. Water supply in South Africa, however, is limited, unevenly distributed and negatively impacted by climate change (Blignaut and Heerdeny 2009: 1), the prevalence and spread of invasive alien plant species (Blignaut 2007: 28); as well as human factors (Wegerich 2001: 9). The limited water supply generally favours the populace of urban centres which often have sufficient water supply, while rural communities are often left marginalised, having access to only limited water supply (Seekings 2010: 5).

From a global perspective, an estimated 2 billion individuals are affected by the declining access to fresh water. This has often resulted in the reduction of food production, adversely affected human health and slowed economic growth (Brels, Coates and Loores 2008: 38). Bearing in mind this reality, the importance of water resource management cannot be over emphasised. An effective water resource management strategy can assist in the aforementioned challenges being minimised to a bearable extent (Bhatti, Koike and Nasu 2012: 4). To have a good water resource management practice, water resources should be adequately allocated to each of the demanding sectors (Taigbenu, Ncube and Boroto 2010: 2). This is not the case in Ward 19, as the demand for water for agriculture is not being met.

During the past 18 years, the Department of Water Affairs (2012: 22) has been able to reduce water supply backlogs in South Africa from 41 percent to 5 percent. Despite these impressive efforts, there are still several communities lacking potable water in KZN. The water backlogs are more obvious in the rural areas of KZN, which covers about 60 percent of the province's land mass. KwaZulu-Natal is traditionally known to be the major province dealing with agricultural produce but with an insufficient water supply for agricultural purposes. Water shortage has been a major constraint on development in this sector (World Wildlife Fund 2011: 5), as water is the

life blood of agriculture. The shortage of water over the years has undoubtedly adversely affected rural development, as water supply is the life blood of farming. When interviewed on 9th January 2013, Mr. C.V Mkhwanazi (Councillor for Ward 19) stated that Ward 19 is amongst the most adversely affected wards with water scarcity in KZN. This ward also faces backlogs in electricity supply, sanitation and housing, which when available are accelerators of growth and development (Mtubatuba Municipality IDP 2011: 66).

At Mtubatuba, the river intake water treatment plant is designed to pump and purify 12 million litres per day. However, it is currently operating at a capacity of 16 million litres per day, which is still insufficient to support the current level of development, let alone cope with the desperately needed residential, commercial, agricultural and industrial growth and development. Besides the Mfolozi river, Mtubatuba Municipality also has the Imbunku Dam which serves as a back up to the Mfolozi river during winter. There is also the Hluhluwe river supplying water to 4 of the 19 Wards, excluding the area of study. The Jozini Dam, which is the largest dam in KZN and among the largest in South Africa, supplies water only to Zululand and does not supply water to Umkanyakude, which is in great need of water (Mtubatuba Municipality is one among the 5 Municipalities in Umkanyakude).

When interviewed on the 28th September 2012, Mr. Madlala from the DWA stated that the sources of water supply for Mtubatuba are the Mfolozi River and boreholes which are fast drying up. He also mentioned that the illegal water connections to the main supply sometimes caused the disruption of water supply to the main water users. Mr. Madlala further explained the adverse effect that Tendelecoal Mining (Pty) Ltd has on the limited water resource as this mining company contaminates the water resource, making it unsuitable for domestic and agricultural purposes. In a telephone conversation on 18th February 2013, the social facilitator at the

Mtubatuba Municipality, Mr. Mlungwana, highlighted additional challenges to the water supply systems and sources as being the poor maintenance of the mechanical equipment used for water supply, theft of plumbing components to produce jewellery such as rings and animals damaging the reticulation system.

In view of this concern, the provincial (Department of Rural Development and Land Reform, KwaZulu Natal) as well as the district administration (Department of Agriculture, Environmental Affairs and Rural Development, Mtubatuba Municipality) have initiatives to improve the agricultural sector, thereby improving the standard of living amongst this deprived settlement. However, the impact is yet to be felt by the residents of Ward 19 as more development is required in this community.

1.3 Research Problem and Aims

According to Puste, Tanuj, Mandal, Gunri, Banerjee, Dasgupta and Maiti (2013: 23), water is the most valuable natural resource. The total quantity of water resources is estimated at about 1,384 million Kilolitres. Of this enormous quantity, only 2.84 percent is fresh water, while the remaining 97.16 per cent which is neither suitable for domestic nor agricultural usage, occurs in oceans as salt. However, the quantity of this resource is fixed as it cannot be regenerated or renewed. This therefore explains why water is inestimable. This statement is supported by Morrison and Corona (2013: 1) who emphasise the importance of water in the following statement: "*water is essential to life, making its total economic value immeasurable*".

Chenje and Johnson (1996: xv) point out the importance of water to human life when they mention how great rivers such the Nile, Niger, Limpopo and the Zambezi gave birth to African civilisations. The Nile was not just an agricultural boom for Egypt, it was also the country's most

important roadway, serving as the main thoroughfare to encourage travel and communication and to connect outlying portions of Egypt to the capital. The ancient Egyptians could not have existed without the river Nile because of the almost non-existence of rainfall in Egypt. The floods provided the only source of water substance to sustain crops. The Egyptians experienced such great success cultivating the Nile that the area became densely populated. In view of this, Egyptian society evolved rapidly, developing its own systems of record keeping, accounting and writing (http://adventure.howstuffworks.com/nile-river2.htm). Such a need for adequate water also exists in the area of study for further rural agricultural development. As evidenced, there is great potential for development and growth where there is sufficient water supply.

When interviewed on 9th January 2013, Mkhwanazi (Councillor to Ward 19) stated that the demand for water is more than twice the water supply in this community. Water shortage has adversely affected the agricultural, industrial and tourism sectors in Ward 19 and Mtubatuba as a whole. Water supply by the Mtubatuba Municipality is often irregular, as revealed by a resident who claimed that there are periods during which they do not have water supply for domestic purposes for 3- 4 days. This is most common in dry seasons.

Furthermore, included in the Integrated Development Plan (IDP) and municipal vision is not only the provision of sufficient water and sewerage disposal infrastructure, but the also maintenance of existing infrastructure and plans for expansion. The critical water shortage is stifling the economic growth and development throughout the municipal area (Mtubatuba Municipality Integrated Development Plan 2011:11) as the impact of water scarcity is felt through every sector.

The aim of this study is to examine the role of water supply for rural agricultural development in Ward 19 of Mtubatuba Municipality. The study has the following objectives:

- To evaluate water resource management in Mtubatuba Municipality;
- To assess water supply and demand in Ward 19;
- To analyse the effect of water supply on subsistence farming in Ward 19; and
- To make recommendations to improve water resource management in Ward 19.

1.4 Significance of the study

This study is motivated by the slow improvement in the standard of living among subsistence farmers of Ward 19 over the last decade (Bacus 2013: 31). Subsistence farming plays an important role as a considerable percentage of rural communities in KwaZulu-Natal are involved in this mode of farming. Many amongst these farmers are living below the poverty line. It is arguable that the development of subsistence farming will translate into rural development, and hence a better standard of living amongst the subsistence farmers (Taigbenu, Ncube and Boroto 2010: 4-5). Baiphethi and Jacobs (2009: 7-9) justify this preposition when they assert that a significant percentage of the rural communities in South Africa are engaged in subsistence farming. Therefore, underpinning subsistence farming will have an inverse effect on households engaged in subsistence farming and will also result in a decline in poverty. Furthermore, the resourceful utilisation of scarce resources such as water is in line with the National Development Plan of South Africa (National Development Plan (NDP) 2011: 227).

1.5 Methodology

The research methodology used was the mixed research approach. Questionnaires and semi-structured interviews were used to gather the required information. Questionnaires were given to farmers in Ward 19. Interviews was conducted with 3 senior officials from the regional office of the Department of Water Affairs in Durban; 3 staff members from the Mtubatuba Municipality; 2 individuals from Ward 19; 2 senior staff members from the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba; as well as 2 senior staff members from Umkanyakude, the water supplier for the Mtubatuba Municipality. The sample population for this study comprised 50 amongst the 85 subsistence farmers of Ward 19 who were selected through the simple random sampling method. The information obtained through the questionnaires and interviews were collated and grouped into related themes. This was further analysed in order to determine informative findings. Recommendations as well as conclusions were then made. A more elaborate description of how the present research was carried out is provided in the research methodology section in Chapter four.

1.6 Scope and limitation of the study

This study revolved around water resource management for subsistence farming in the Ward 19 area of Mtubatuba Municipality, situated in the KwaZulu-Natal Province. The study focused only on subsistence farming as it cannot be generalised to other sectors in manufacturing, mining, tourism and commercial farming. The inability of the researcher to communicate in IsiZulu was a constraint as the participants of the study are mainly IsiZulu speaking people**.** In communicating with some of the participants, the researcher made use of interpreters who are able to speak both the English and IsiZulu languages fluently.

1.7 Structure of dissertation

This dissertation comprises of six chapters. These chapters will be segmented as follows;

Chapter One: Introduction

Chapter one demarcates the field of study and provides the significance, scope and limitation of the research topic. It further highlights the aim and objectives and serves to provide an overview of the entire research.

Chapter Two: Water resource management, rural development and subsistence farming

This chapter presents existing literature on subsistence farming and water resource management within the South African context. An overview of rural South Africa and the main source of livelihood (subsistence farming) in this community are discussed.

In addition, the role and constraints to subsistence farming in rural KwaZulu-Natal are discussed. Legislations, acts and policies underpinning subsistence farming, as well as strategies in developing rural KZN as a whole, are reviewed. The chapter concludes by highlighting the role water resource management can play in improving subsistence farming.

Chapter Three: Water resource management in Ward 19

This chapter provides the background into the area under study. It analyses the impact of water scarcity and other natural resources on subsistence farming. The chapter also explained how natural resources have impeded rural development in the Ward 19 area of Mtubatuba Municipality.

Chapter Four: Research methodology

This chapter focuses on the research approach, data collection method, target population, sample size, sampling strategy and data analysis. It includes discussions on the reliability and validity of the study.

Chapter Five: Statement of findings, interpretation and discussion of the primary data

This chapter presents the statistical results of the questionnaires and interviews that were conducted. The findings will thereafter be discussed and analysed in relation to the study's objectives.

Chapter Six: Conclusions and recommendations

The conclusions to this study are drawn. Recommendations are also made in relation to the aim and objectives of the study.

1.8 Conclusion

Chapter one provided a background to the study; research problems; aim and objectives; importance of the research; research method; as well as the scope and limitations. The next chapter reviews the literature on the imperativeness of water resource management for subsistence farming within the rural South African context.

Chapter 2: Water resource management and subsistence farming

2.1 Introduction

This chapter presents existing literature on subsistence farming, water resource management within the South African context and legislation on rural development in KwaZulu-Natal. In addition, the role of and constraints to subsistence farming in rural KwaZulu-Natal, government interventions in revamping the subsistence farming, as well as strategies in developing rural KZN as a whole are discussed. The chapter concludes by highlighting the importance of water resource management for subsistence farming.

2.2 Public management

According to Meuleman (2008: 77), the managerial role in the public management sector differs to what is obtainable in the private sector. Private sector management aims to perform their activities as quickly as possible, while ensuring that minimum cost is expended on such action. On the contrary, Meuleman (2008: 77) explains that public sector management carries out its task while ensuring welfarism and equity. Performance in the public sector can be evaluated through the quality of services rendered by governmental departments to the populace (Forbes, Hill and Lynn 2005:10). Forbes *et al.,* (2005: 10) stipulate that "*the study of public management is concerned with managerial activity itself: the discretionary choices of actors in managerial roles, choices that are, of course, both enabled and constrained by formal authority. The need for management arises when legislation has explicitly delegated the authority to choose appropriate actions to executive agencies, when legislative mandates are ambiguous, necessitating decisions by managers as to how they should be interpreted and implemented and when fulfilling policy objectives requires managerial judgment in applying rules and standards in particular classes of cases"*. From the aforementioned quotation, it can be inferred that public

management is a field which manages resources by specific key players (government officials). In addition, it may be deduced that actors are required to implement legislation while adhering to certain protocols. Berkley (2004: 54 cited by Sheoraj 2007: 88) summarises the major functions of public managers as planning, organising, staffing, directing, coordinating, reporting and budgeting. The White paper on "Transforming Public Service Delivery" emphasises the role of public managers as stated in the Constitution (1996). The White paper stipulates that public managers should adhere to the following principles (Chipkin 2011: 6):

- a high standard of professional ethics be promoted and maintained;
- services be provided impartially, fairly, equitably and without bias;
- resources be utilised efficiently, economically and effectively;
- peoples' needs be responded to;
- the public be encouraged to participate in policy-making; and
- it be accountable, transparent and development-oriented.

Thus, adherence to these principles will result to an effective public management.

2.3 New Public Management (NPM)

New Public Management (NPM) has been practiced across several countries. These countries include the United States of America, New Zealand, France and Australia. The NPM's framework is designed to address the challenges faced by the public sector (Cameron 2009: 910-911; Chipkin 2011: 3-6).

According to Chipkin and Lipietz (2012: 3), the NPM brought about a number of changes. Some of these changes include effectiveness in the public service, as well as political and financial

accountability. Cameron (2009: 937) also concurs with this view when he mentioned that the NPM has resulted in greater efficiency and cost savings in the South African public sector. He further asserts that there has been more efficiency, particularly in the Treasury.

The NPM viewpoint is often linked with constructive, action - oriented phrases such as reinventing government; re-engineering, revitalization of the public service; organisational transformation; total quality management, paradigm shift; entrepreneurship; empowerment; results over process; downsizing, now rightsizing; lean and mean; contracting out; off-loading or outsourcing; steering rather than rowing; empowering rather than serving; and earning rather than spending (Frederickson, 1996 cited by Ayee 2005: 2). The NPM was used as a structural, organisational and managerial tool in public sectors in countries such as the United Kingdom, New Zealand and Australia (in the late 1970s) (Ayee 2005: 2).

Ayee (2005: 3) asserts that the key components of the NPM can be categorised into two strands. The first strand consists of ideas and themes that emphasise managerial improvement and organisational restructuring, that is, managerialism in the public sector; while the second strand consists of ideas and themes which highlight markets and competition. Ayee (2005: 12) further asserts that the relevance of the NPM to public sector management exists in four key areas;

- decentralising management, disaggregating and downsizing of public services;
- performance contracting, which has become an instrument to reform state-owned enterprises (SOEs);
- contracting out of the provision of public services is part of efforts to reconfigure state-market relations in order to give more prominence to markets and the private sector; and

- the introduction of user fees or charges, which is one of the major developments in the provision of public services under structural adjustments programs (SAPs) if privatisation is not being pursued**.**

On the contrary, the traditional/ Old Public Management (OPM) has been criticised from several perspectives. It has been argued that the old approach is too cumbersome and inflexible to address the fast changing and diverse demands of modern economic and social systems as this approach is prone to stagnation, inefficiency or, even worse, corruption (Chipkin and Lipietz 2012: 1).

However, Sandbrook, Edelman, Heller and Teichman (2007: 10) argue that the same bureaucratic approach (Old Public Management) underscored industrialisation in the United Kingdom, United States, as well as Russia where great development and growth were recorded over decades. Sandbrook *et al.,* (2007:11) further argue that the OPM approach can be credited to the developmental states of Japan, South Korea and Taiwan (Evans 1995; Sandbrook et al., 2007).

Chipkin and Lipietz (2012: 3) advocate that the NPM was structured to combat the perceived inefficient and wasteful propensities inherent in OPM. Chipkin and Lipietz (2012: 3) maintains that NPM sought to palliate OPMs accountability deficits through the introduction of a market-based mechanism which enabled a shorter and more reliable procedure than the long processes promoted by the bureaucratic OPM approach.

Promoters of the NPM recognised that public managers as well as civil servants often have their personal motives and tend to align these motives and those of the organisation in which they

worked through a system of rewards and sanctions, most notably through ‘performance management’ contracts **(**Chipkin and Lipietz 2012: 3).

2.4 Reforms in the South African public sector

The post-apartheid government, which assumed office in 1994, inherited a disjointed public service. This posed a challenge for the new government as it was confronted with an insurmountable level of inequality in terms of services rendered before even assuming power. Services could not be interrupted until a new system was in place. This therefore led to reform being undertaken in different phases (Chipkin and Lipietz 2012: 5).

Kuye (2007: 295-299) provides a breakdown of the reforms which occurred in the public managerial sector of South Africa (post-apartheid) as follows:

First stage reform: Public Service Act, 1994;

Second stage reform: Reconstruction and Development Programme;

Third stage reform: Transformation of public service;

Fourth stage: Service delivery improvement; and

Fifth stage reform: The Presidential Review Commission.

(The aforementioned reforms will be elaborated upon in the later section of this study).

According to Kuye (2007: 301), some of the reforms were considered as milestones in the public sector of South Africa. For instance, the public sector reform of 1994 underpinned the process of

equity in the public service. Furthermore, the Batho Pele White paper initiated the process of acknowledging the importance of the **receivers** of public services. Kuye (2007: 308) buttresses his argument by highlighting some remarkable achievements made by the public sector reforms. These include (Kuye 2007:308):

- The establishment of a new public service in 1994 within two months after assuming office to incorporate the public services of the various services that existed prior to 1994;
- The ability to expand public services to all formerly disadvantaged communities without interrupting existing services;
- Democratising governance through the Batho Pele white paper without forfeiting the public accountability function of ministers or public officials;
- Establishing and maintaining a major role in Africa and the rest of the world after a period of isolation of nearly 35 years as a result of the policies of the former government; and
- Improving the economic situation in South Africa by succeeding in limiting the rate of inflation to about 4% while improving the delivery of public services to all communities.

However, despite the initiatives and policies, the development of public management in South Africa is still constrained by certain key elements. These key elements include corruption and mismanagement of resources; a lack of transparency and accountability; ineffective management of cultural diversity at the workplace, a lack of representatives; the lack of training and development of staff, lack of a developmental culture; a lack of management information systems; and the lack of professional ethos and poor work ethics due to de-motivation of staff members (Sheoraj 2007: 98-102). According to Chipkin (2011: 1), the South African state is in a *paradoxical position* due to the transition to democracy. He further states that the government,

the judiciary system, police services as well as the public service is required to play a leading role in attaining the stability of the nation, while meeting the complex social and economic demands of the citizenry. Chipkin (2011: 1) further highlights the following as constraints to the development in public management: the high rates of senior staff turnover, the lack of political clout and pressure on line employees.

- **Extent of adoption of the NPM reforms in the public sector of South Africa**

In Cameron's (2009: 936) view, the NPM reforms appear to be only superficial. Cameron (2009: 936) bases his preposition on the poor adoption of the NPM reform in specific sectors of the South African public services. He states that a major constituent of the NPM is the decentralisation of authority and responsibility to managers. Cameron (2009: 937) argues that while a structure for decentralisation has been put in place, the reality is that there has not been as much expected decentralisation as pre-empted. He mentions that there has been restricted delegation of tasks to managers by Ministers. Cameron (2009: 937) further posits that there have been moves towards a stronger central state in the South African public sector in recent years. Cameron (2009: 938) also mentions that corporatisation, which is also a major component of the NPM reform, has been significantly adopted by the public sector of South Africa as some of the public entities have been outsourced to private entities. Cameron (2009: 938) also states that a major feature of the NPM reform - contract appointment of staff-has been widely adopted in the public service as the government often employs director generals on a three-year contract basis. Cameron (2009: 938) further mentions that performance management, which is also a feature of the NPM reform, has been erratically and inconsistently applied.

Improved service delivery has also been a proponent of the NPM that has not been fully adopted. Although there has been a number of measures to improve service delivery by the government,

backlogs of services are still been recorded, more particularly amongst the rural communities of South Africa (Bacus 2013: 31**;** Cameron 2009: 938).

2.4.1 Development from a socio-economic perspective

Development means different things to different people. According to the Cambridge Advanced Learner's Dictionary (2008: 384), development occurs when "*someone or something grows or changes and becomes more advanced"*. Hameso (2001: 4) defines development as "*a complex set of processes of change that encompasses the economy, society and the polity, expansion of an economy's productive capacity and favourable change in the quality of life as determined by improvement in people's living standards*." Development as a means of poverty alleviation encompasses access to resources, empowerment, securing independence, building self-esteem and the general improvement of livelihood. The United Nations Development Programme (UNDP), on the other hand, defines human development as a process of increasing human choices (UNDP 2007: 1). This definition is supported by Alkire (2010: 2-3) when he defined human development as *'a process of enlarging people's choices'*. He further elaborates this definition by stating that human development encompasses citizenry living a long and healthy life with access to quality education, as well as a good standard of living. In addition, Alkire (2010: 3) argues that increased choices are inclusive of political freedom, guaranteed human rights and self-respect. In order to achieve development, it is important that the underdeveloped first have access to resources such as water.

Development has been described and defined by several authors and sources. One such source defines development as *the systematic use of scientific and technical knowledge to meet specific objectives or requirements.* This implies that development is a concerted effort in an organised manner to achieve certain goals. Also, development is the *process of economic and social*

transformation that is based on complex cultural and environmental factors and their interactions. Development in this context means the interaction of different factors channelled to enhance socio-economic progression. Development could also be described as the *process of adding improvements to a parcel of land, such as grading, access, roads and utilities* (http://m.businessdictionary.com/definition/development.html). Development here implies the upgrade of land and other infrastructure.

Furthermore, development transcends economic growth as it also entails the improvement of the social, economic and human aspects of people. To promote development, the individuals affected must be given utmost priority and this developmental agenda should be driven by the people that it seeks to develop. Hence, the intent of development is not subjected to increased income, but to increase all human choices as regards access to basic needs and sustainable livelihood (Department of Rural Development 2013: 1).

The reform in the South African public sector has resulted to significant development in certain aspects. The reformation of the public service has enhanced service delivery. However, the rural populace have not fully benefitted from this reformation process (Cameron 2009: 938). Furthermore, the reformation in the public sector has led to the effectiveness of the public sector as well as accountability, which has an inverse effect on development (Chipkin and Lipietz 2012: 3-4).

- **National Development Plan (NDP)**

In 2011, to set a development agenda for the nation, the South African government compiled the "National Development Plan- Vision for 2030". According to the NDP (2011: 3), the nine areas of priority identified are:

1. An insignificant portion of the populace are working;
2. Poor quality of education, mostly amongst black learners;
3. Infrastructural challenges and poor maintenance of the available ones;
4. Spatial patterns exclude the poor from the fruits of development;
5. The economy is overly and unsustainably resource-intensive;
6. A wide spread disease burden is compounded by a failing public health system;
7. Public services are uneven and often of poor quality;
8. Wide spread corruption; and
9. Disunity amongst South Africans.

Although none of the nine areas of priority directly relate to agriculture, the first and fourth itemised points relate to standards of living, while the fifth point encompasses water resource management. These three points can eventually underpin rural development in the long run.

In achieving some of the goals before the 2030 deadline, the South African government has accomplished the following within the past two years: provided an estimated 3 million work opportunities; a significant increase in the pass rate of matriculants (78 percent in 2013); infrastructure expansion of transport, energy, water, communications capacity and housing; an increment of 12 percent in student enrolment at the university level (Wilkinson, Brodie, Chiumia and Rademeyer 2014: 2-3). Furthermore, the educational sector also recorded a drastic increase of 90 percent enrolment among Further Education and Training (FET) college students (Wilkinson *et al.,* 2014: 2-4; Department of Public Works 2013).

However, in 2013, in order to drive development, the national government focused on 12 key areas which have been identified and agreed upon by the cabinet. These include (Bacus 2013: 14):

1. Improved quality of basic education;

2. A long and healthy life for all South Africans;

3. All people in South Africa are and feel safe;

4. Decent employment through inclusive economic growth;

5. A skilled and capable workforce to support an inclusive growth path;

6. An efficient, competitive and responsive economic infrastructure network;

7. Vibrant, equitable and sustainable rural communities with food security for all;

8. Sustainable human settlements and improved quality of household life;

9. A responsive, accountable, effective and efficient local government system;

10. Environmental assets and natural resources that are well protected and continually enhanced;

11. Create a better South Africa and contribute to a better and safer Africa and world; and

12. An efficient, effective and development oriented public service and an empowered, fair and inclusive citizenship.

The7th and 8th highlighted key areas of development among the 12 are directly related to rural development. The 7th point is expected to promote a vibrant and sustainable rural community

while ensuring food security by a conscious effort to develop agriculture. The 8th point is also intended to enhance the standard of living, thereby accelerating rural development.

As evaluated by Kumo, Rieländer and Omilola (2014: 3-4), development in South Africa has been constrained by the slow pace of international growth. Kumo *et al.,* (2014:4) forecasted that the economy will grow by 2.7% in 2014 as compared to 1.9% and 2.5% recorded in 2013 and 2012 respectively. Kumo *et al.,* (2014:4) base their prediction on the global economy growth, as well as the successful completion of major projects such as the Medupi Power station. Despite progress, unemployment and labour relations continue to pose challenges to the nation's economy, as 24.1% of job seekers are unemployed.

The South African developmental agenda has faced several criticisms from unions, economic analysts and politicians. The Congress of South African Trade Unions (COSATU) argues that the National Development Plan failed to recognise the growth in the financial sector due to the "*financialisation of the South African economy"*. They argue that this has emanated as a result of the production sector of the South African economy and therefore creates more employment. In addition, it is a relatively *small employer in relation to its huge size in the economy* (*12% of GDP, while it only employs 3% of the employed*). The COSATU also revealed the statistical and factual errors contained in the National Development Plan (NDP) which the proposal draws its conclusions from. Furthermore, COSATU is of the view that some of the proposed plans are not realistic within the purported timeframe (www.cosatu.org.za/docs/discussion/2013/analysis.pdf).

The COSATU view is reiterated by Cilliers and Camp (2013: 2) when they mention that the NDP 2030 is impracticable. They base their argument on the systemic change in the structure and efficiency of the South African economy. Cilliers and Camp (2013: 2) argue that the

economic targets set by the NDP are not achievable within the proposed period. As reported by Sapa (2011: 2), Helen Zille (the Premier to the Western Cape Province) concurs with the two earlier arguments. She places emphasis on the retrogressing South African economic situation. Helen Zille further expounds that the NDP is not well tailored to address the South African epidemic situation. Furthermore, she was reported to have said "*the NDP would struggle to get off the ground under the current government*". The slow pace of development in Ward 19, as well as many rural communities justifies, the impracticability of set targets raised in the NDP, as no significant development has been realised in this poor community. Development, however, is often gradual. As justified by several studies, development is a process which takes place over a long period of time (Barder 2012: 15-16; Szirmai 2005: 6-8).

Development is imperative in the post-apartheid era as there still exists inequality amongst the South African populace (Finn, Leibbrandt and Wegner 2011: 72). This inequality is more pronounced in rural communities such as Ward 19 in Mtubatuba Municipality (Triegaardt 2009: 2-3).

- **Development of water infrastructure**

Empirical studies (Morrison and Corona 2013: 4-5; Thorlakson and Neufeldt (2012: 3-5; Puste *et al*., 2013: 1) have shown the inter-relationship between water availability and development. With this understanding, the KZN administration has made several efforts towards improving service delivery in terms of water supply to rural communities. As at 31 March 2012, an estimated 84% of households in KZN had access to potable water within 200 metres of their respective places of residence. This 84% record comprises both the urban and rural parts of the province. The Department of Water Affairs (DWA) has taken the remote areas of rural KZN as a priority and

bulk water infrastructure is presently been developed. However, despite the recorded progress, a backlog in water supply delivery still exists in an estimated 408,000 households (Department of Rural Development 2013: 11).

2.4.1.1 Historical consequence of the apartheid era

The apartheid era distinguishes South Africa from other African countries. One of the negative consequences of the apartheid regime was the dispossession of the majority of black South Africans from their land. This dispossession brought about land ownership inequality between the Black and White races, discrimination and marginalisation of black citizens. The regions where Blacks resided were characterised by poor service delivery, as compared to the quality services enjoyed by white South Africans during the apartheid regime.

As a result of the apartheid policy, the former homelands had few educators, police and health workers. These workers were usually unqualified and could only offer poor services (Department of Rural Development and Land Reform 2013: 6). After a century, the resultant effect is still felt among some rural communities in rural KZN, which are characterised by high levels of poverty, marginalisation and service delivery backlogs (Seekings 2010: 5).

2.4.2 Rural development

Satje (2009: 1) defines rural development as a deliberate strategy aimed at improving the quality of life of a rural populace. Rural development can also be defined as "*actions and initiatives taken to improve the standard of living in non-urban neighbourhoods, the countryside, and remote villages*" (http://www.geo.mtu.edu/~asmayer/rural_sustain/intro/Module1c.pdf). The Department of Rural Development offers a more elaborate definition of rural development. It defines it as *"enabling rural people to take control of their destiny, thereby dealing effectively*

with rural poverty through the optimal use and management of natural resources. It is a participatory process through which rural people learn over time, through their own experiences and initiatives, how to adapt their indigenous knowledge to their changing world. Rural development can be achieved through self-help initiatives as well as through co-ordinated and integrated broad-based agrarian transformation; through strategic investment in economic and social infrastructure that benefits entire rural communities, and not only those involved in agriculture" (Department of Rural Development 2013: 1). In the context of this definition put forward by the Department of Rural Development, in an attempt to address poverty through the optimal use of natural resources, a group of 20 subsistence farmers in Ward 19 have utilised their farming experiences and initiatives to set up a farming project which is propelled to accelerate rural development in their community.

Rural development strategies are intended to advance the economic and communal lifestyle of the rural populace, particularly the less privileged people. It is designed to have a wide range of benefits of growth and development to the poor dwellers of the rural community (Bacus 2013: 20). In the State of the Nation Address given by President Jacob Zuma on the 13th of February 2013, the president gave clarity on the need to accelerate the pace of development in rural communities across South Africa. He mentioned that these communities have suffered infrastructural backlogs, among other challenges. President Jacob Zuma further stated that his administration will alleviate the poverty experienced by rural dwellers within the shortest time available (Government Communication and Information System 2013: 2-4). This assurance of poverty emancipation by the president has not been fulfilled as the community of Ward 19 still wallow in poverty.

2.4.2.1 Role of government in promoting rural development

Local government officials are expected to play vital roles in facilitating rural development with rural communities by identifying the challenges and providing solutions to these issues within their respective jurisdictions (Department of Rural Development 2013: 3). This implies that the rate of development, growth, failure or stagnation could be partly attributed to local government officials. While local government officials relate with their immediate constituency, government at the provincial and national levels equally contribute to rural KZN through the Departments of Rural Development and Land Reform. There are 3 phases relating to rural developmental policies in South Africa where the 3 levels of government (district, provincial and national) are involved (Bacus 2013: 3):

1. 1994–2000: the Reconstruction and Development Programme (RDP);

2. 2000–April 2009: the Integrated Sustainable Rural Development Strategy (ISRDP); and

3. April 2009: the National Comprehensive Rural Development Programme (CRDP).

To tackle rural underdevelopment, several sectoral strategies have been proposed by the government. However, the strategies have not achieved the anticipated benefits (Department of Rural development 2013: 3-4).

2.4.2.2 Importance of rural development

Several researchers and policy makers have argued for the importance of rural development as this set of people is often the most neglected in most countries **(**Department of Rural Development 2013: 3-5, Cleaver 2013: 6**)**. One of the main areas of focus in the South African National Development Plan was an agenda to develop rural communities across the country in order to bridge the gap of inequality between poverty stricken citizens and the rich class (South

Africa National Development Plan 2011: 195-196). Firstly, a significant percentage of the rural communities in KZN, as well as other South African rural areas, live below the poverty line. This literally translates into the situation where almost every child born in rural households are born into poor households. An underdeveloped rural community will worsen the poverty scenario in rural South Africa and also lead to more unhealthy citizens and economically disempowered individuals.

Also worth mentioning is the argument put forward by the Rural Development Strategy of the Government of National Unity. They advocate that that countries who focus on tackling rural poverty in comparison to urban poverty have been able to decrease the poverty rate faster than countries who focus more on urban poverty (http://www.polity.org.za/polity/govdocs /rdp/rural2.html). Moreover, the South African manufacturing sector is heavily dependent on the agricultural producers; implying that if the rural setting where many of the farming activities takes place is not developed, it will have a negative consequence on the manufacturing sector of the country as well as its economy. Developing the rural areas through such activities like farming will generate more job opportunities, thereby elevating poverty (http://www.polity .org.za/ /polity/govdocs/rdp/rural2.html).

2.4.2.3 Subsistence farming

Subsistence farming is defined as "*the production of sufficient food and fibre to satisfy the needs of the farming family*". It was a common practice in the past where large numbers of farmers produced only what they required. They collected fuel and building materials in their community and played little part in the cash economy (Spedding 1979 cited in Wim Van Averbeke 2008: 1). Goldchild (2011: 1) defines subsistence farming as a localised form of agriculture which requires primitive or less-advanced farming tools. He adds that subsistence farming has three basic

characteristics. Firstly, it deals with less-advanced technology. Secondly, subsistence farming is expected to be water-efficient. This implies that the municipality is not expected to provide water for this form of farming. Lastly, subsistence farming mainly deals with a vegetarian way of life. Subsistence farmers often focus on crop production and are hardly involved in animal rearing.

The Department of Agriculture, Forestry and Fisheries (DAFF) further expounds that the main features of subsistence farming revolve around crop production, stock rearing and similar activities for (farmer's) household's consumption. However, these activities are often characterised with uncertainty and low productivity (http://www.daff.gov.za/docs/statsinfo /Chapter%209.htm).

According to Spedding (1979 cited in Wim Van Averbeke 2008: 1), subsistence farmers produce mainly for household consumption and not for sale. However, Janvry and Sadoulet (2011: 479) are of the opinion that subsistence farmers sell some of their produce. They identified the production of sufficient food to feed the household as the primary objective of subsistence farming, while earning some cash income and accumulation of savings were secondary.

Calzadilla, Zhu, Rehdanz, Tol and Ringler (2013: 4) argue that subsistence farming plays a vital role amongst the rural populace, particularly in the former homelands. Calzadilla *et al.*, (2013: 4) assert that more than 37 per cent of the South African rural populace are gainfully employed through this mode of farming. In addition, they claim that subsistence farmers are mainly women who were older than their counterparts working in the formal and informal sector of the former homelands.

The 1913 Natives Land Act had grave consequence for subsistence farming. Enormous losses of livestock, crops and land occurred owing to the dispossession of Blacks by the government. This

Act was proposed to confine the black populace (which constituted 80 percent of the then South African population) to 13 percent of the national land surface area (Van Onselen, 1996 cited by Department of Rural Development and Land Reform 2013: 5). Blacks were forced into reserve areas which were the most environmentally degraded farm lands. These reserve regions were unsuitable for farming purposes as they were mostly characterised by rocky areas with thin topsoil, as well as erratic rainfall. Subsequently, the apartheid government gained control over regions rich in mineral resources which were also (mostly) suitable for agricultural purposes. The environmental deterioration, such as poor soil quality, in the black community can mainly be ascribed to the low productivity of subsistence farming over the last century in KZN (Department of Rural Development and Land Reform 2013: 4).

Averbeke (2008: 12-13) explains that rural subsistence farming declined during the 20th century in South Africa as a result of a combination of political, economic and social factors. At the inception of the 21st century, subsistence farming was still wide spread amongst rural African homesteads but had become a complementary activity in their livelihood portfolios. The decline in subsistence farming could also be attributed to developments within the homelands as few job opportunities were created in the civil service, particularly in the education and health sectors. The few local residents that had these jobs had a better standard of living, which resulted in discouragement amongst some subsistence farmers. Also, some industrial decentralisation policies generated non-agricultural means of livelihood in the light industry (Averbeke 2008: 13).

The rapid growth in the South African manufacturing and mining industries in the last three decades has contributed to the decline in the agricultural sector. The causative effect of the decline in the agricultural sector can be attributed to the lucrative job opportunities created by the

manufacturing and mining sectors. In addition, both the manufacturing and mining sectors received more governmental support in comparison with the agricultural sector (Goldblatt 2010: 22-24). The agricultural sector has significantly lost its share in the GDP as compared to the manufacturing and mining sectors. However, despite the decline in the agricultural sector, it is argued that it is a dominant and successful sector as it employs 10 percent of the total South African workforce, while one-third of its production is exported across the globe. A significant portion of this exportation is however dominated by medium- to large-scale farms **(**Calzadilla, Zhu, Rehdanz, Tol and Ringler 2013: 4).

Goldblatt (2010: 23) amplifies the view of Calzadilla *et al.,* (2013:4) by stating that agriculture is a vital sector as it generates employment and reduces poverty in South Africa. However, Goldblatt (2010: 23) also argues that employment in the agricultural sector has declined significantly in recent times, more particularly in the commercial agricultural sector. He mentions that commercial farming in recent times has adopted a mechanised form of farming whereby few farm workers are required.

According to Cloete, Bezuidenhout, Idsardi, Kuhn, Clus, Spies, Steenkamp, Merwe, and Zwan (2013: 85-86), the number of employees in the agricultural sector remained stagnant till 2000. However, there was a sharp decline in the number of employees in this sector from 1 799 000 in 2000 to 750 000 in 2011. Cloete *et al.,* (2013: 85) explain that the cause of the decline in this sector can be attributed to the increment in the cost of labour and the prevailing mechanised farming approach.

A survey conducted by Statistics South Africa in 2011 revealed that a total of 2.9 million households in South Africa are involved in agriculture (Statistics South Africa 2013: 3). The

survey further shows that the three provinces having the highest number of households involved in agriculture are KwaZulu-Natal, Eastern Cape and Limpopo, with a total percentage of 24,9%, 20,7% and 16,3% respectively. On the other hand, the provinces with the lowest number of households were found in the Northern Cape and Western Cape at 1,9% and 2,9% respectively (Statistics South Africa 2013: 3).

Numerically, the 2011 Agricultural household survey estimated the total number of agricultural households in South Africa at 2 879 638, while the non-agricultural households were estimated at 11 570 505. Among the 2 539 429 total number of households in KwaZulu- Natal, 717 006 households were involved in agriculture, while the remaining 1 822 413 were not into any form of agricultural practices (Statistics South Africa 2013: 12).

In addition, Statistics South Africa (2013: 3) reveals that 71.1 percent of the 717 006 households in KwaZulu-Natal were engaged in subsistence farming. Considering the high percentage of households involved in subsistence farming, more attention should be given to subsistence farming in KwaZulu-Natal. As iterated in this section, the exigency of developing the subsistence form of farming cannot be overemphasised. For this reason, it will be suggested that subsistence farming be revamped in order to accelerate rural development and reduce poverty in rural communities.

The Transformation of Certain Rural Areas Act No 94 of 1998 was specifically enacted to develop some of the deprived communities in South Africa. These targeted communities were mainly the underdeveloped regions which fell under the former homelands. There was also the Abolition of Racially-based Land Measures Act No 108 of 1991 which was intended to impact positively on rural communities. Furthermore, the Abolition of Racially-based Land Act aimed

to reverse the land discrimination between the white and black populace of South Africa, as the Whites had dominance over land during the apartheid era. (http://www.info.gov.za/otherdocs/2000/isrds.pdf). The necessity for an all-inclusive approach to develop both the rural and urban areas arises from the consideration that almost 50 percent of the population of the KZN province reside in rural areas. Most of this populace is often the aged, youth and children who are deprived of basic infrastructure such as an adequate water supply, electricity and tarred roads. The service delivery to these settlements is not comparable to their urban neighbours who often benefit from a quality service delivery by their respective municipalities (Archary 2012: 6-9; Perret 2004: 7). Furthermore, it is essential to develop the rural areas as the overall health and wellbeing of the entire population depends on rural goods and services. A substantial amount of minerals, energy, biodiversity, natural and cultural experiences, land and labour come from the rural areas. As some of these resources become scarcer with the passage of time, it is important to maximise their usage (South African National Development Plan 2011: 239). For these reasons, the development and growth of rural communities in KZN need to be given more attention.

2.4.2.4 Need for subsistence farming in rural areas

The agricultural sector of South Africa is considered to be dualistic in nature as it comprises the capitalised commercial sector on one hand and the fluctuating subsistence sector on the other hand (Vink and Kirsten 2003: 13; May and Carter 2009: 9). Many leading South African agricultural economists describe this sector as comprising a developed part on one side and a developing one on the other side. Commercial farming is considered to be developed, market oriented and on a large-scale, while subsistence farming is developing and on a small-scale. The market-oriented component is dominated by White farmers, while the African farmers dominate

the subsistence component. There is a general consensus by researchers that this divide is a legacy of the racially discriminatory policies of the apartheid era which stunted the natural agricultural development processes amongst black farmers (Lahiff 2000; Ortmann and Machete 2003 cited in Averbeke 2008: 9).

In the 2007 commercial agricultural census, a total of 39 982 commercial farm units were identified in South Africa, producing about 95% of the agricultural output (Statistics South Africa 2009). The commercial sector accounts for 87% of the total agricultural land, while the black subsistence and smallholder producers use the remaining 13% of the agricultural land (Feynes and Meyer 2003).

The subsistence mode of agriculture is of high importance in South Africa and requires more government support the development of subsistence farming has a parallel correlation with rural development in South Africa, as many rural dwellers are engaged in subsistence farming. In America, farming is highly mechanised, organised and garners much government support. American farmers have received support from the (American) government through policies and subsidies which have resulted in significant growth in agriculture in America. Many subsistence farmers in South Africa are often uneducated people and live below the poverty line, as compared to most of the American farmers who are usually educated and have a good standard of living. A recent survey in the United States of America reveals that above 30 percent of farmers have attended colleges and some have obtained their degree, whilst a few others are pursuing their post-graduate studies (http://www.cals.ncsu.edu/CollegeRelations/AGRICU.htm).

A 2007 census conducted in the United States of America reveals that only four percent of the American population are involved in farming and are able to provide sufficient food for the

American population, with a significant quantity for daily exportation to every continent across the globe (www.agcensus.usda.gov).

The small percentage of American farmers involved in agriculture are able to produce a significant quantity of agricultural produce for local consumption, as well exporting to several countries mainly due to high mechanisation of farming, high levels of literacy among farmers and governmental support (Fuglie, MacDonald and Ball 2007: 2-5). On the contrary, the 12 percent of farmers involved in agriculture in South Africa are unable to produce what their American counterparts produce (Statistics South Africa 2011: 3). The reason for the significant difference in the output of agricultural production between both countries include, low levels of mechanisation amongst some South African farmers and low levels of literacy (Agri-South Africa 2013: 2-3; Goldblatt 2010: 12). It is therefore suggested that the South African government provides more incentives and support for subsistence farmers in order to transform a significant proportion of subsistence farmers into commercial farmers as a means of increasing national output of agricultural production and thereby accelerating the pace of rural development (Bhatti, Koike and Nasu 2012: 7-9). While farming is important in countries such as South Africa, it is of less significance in America which shows a different perspective to farming.

2.4.2.5 Water resource management as an imperative for rural development and subsistence farming

As cited earlier in previous sections of this study, several approaches have been made to accelerate development in rural communities, as well as sustaining subsistence farming (Discussion Paper on Agricultural Policy, 1998; White Paper on Agriculture, 1995). However,

these approaches have not yielded the desired result. In addition, the municipalities of rural communities often have limited budgets and for this reason they (municipalities) are unable to finance irrigation on agricultural projects (Mtubatuba Local Municipality IDP 2012: 31-32). Irrigation can possibly result in development and growth of subsistence farming in rural communities as these farm areas are often characterised by low rainfall (Averbeke 2008: 17-19). Hence, as suggested by several studies, in water scarce farming communities, it is necessary to make judicious use of every drop of water in sustaining crops (Taigbenu, Ncube and Boroto 2010: 7; Pennisi 2008:171-173). For this reason, it is arguable that water resource management can underpin the acceleration of growth in rural communities and also result in the development of subsistence farming (Wilk and Jonsson 2013: 696; Bhatti, Koike and Nasu 2012: 5-6).

2.4.2.6 Legislation and policy guiding rural development

In view of the various challenges facing the agricultural sector in rural South Africa, which include water scarcity, increasing loss of soil, rising input cost and dependence on external factors which the farmer has no control over (such as the oil price and exchange rate), high murder rates, and increasing tenure insecurity (World Wildlife Fund 2011: 5), the South African government has put measures in place to address these challenges. It has entrenched constitutional commitments to protecting the environment, as well as sustaining the South African agricultural sector. This is reflected in Section 24 of the Bill of Rights which "*provides every citizen with the right to an environment that is not harmful to their health or well-being*". Furthermore, the government also enacted the Discussion Paper on Agricultural Policy (1998) as an approach to underpinning the agricultural sector.

As noted by Taigbenu, Ncube and Boroto (2010: 3), the South African Water Services Act of 1998 promotes the sustainable and efficient allocation of water resources in enhancing the socio-

economic growth and development of the nation. The question asked is, what effect has this Act and various other similiar Acts had at the grassroots level? Evidence given by Mr. Gumede (Technical Supervisor, Water and Sanitation, Mtubatuba Municipality) on the 6th of December 2014 reveals that the present Act and other similar ones, as well as policies, have not satisfied the water requirements (demand) of Mtubatuba Municipality, as the same water challenges experienced by farmers of Mtubatuba decades ago are still ongoing.

In order to improve and regulate various aspects of agriculture, several initiatives have been put in place. Below are some of the initiatives:

- **White Paper on Agriculture, 1995**

The mission of the White Paper on Agriculture is to ensure equitable access to agriculture and promote the contribution of agriculture to the development of all communities, society at large and the national economy, in order to enhance income, food security, employment and quality of life in a sustainable manner.

- **Discussion Paper on Agricultural Policy, 1998**

In view of the contribution of agriculture to the national economic policy objectives articulated in the Reconstruction and Development Programme (RDP), and later encapsulated in the Growth, Employment and Redistribution (GEAR) strategy, the objectives of the agricultural policy are: economic growth; reducing income inequalities, especially along racial lines; and eliminating poverty. This policy was designed to fast track development and growth in the agricultural sector and to reduce the income gap between the white and black populace with the intent of accelerating the overall standard of living of the rural populace through agriculture.

- **Reconstruction and Development Programme**

The Reconstruction and Development Programme (RDP) is an encompassing, coherent socio-economic policy framework aimed at mobilising the citizenry and country's resources, with the intent of eradicating the apartheid system and establishing a firm democratic, non-racial and non-sexist future. The six basic principles of the RDP include:

- An integrated and sustainable programme;
- A people-driven process;
- Peace and security for all;
- Nation-building;
- Link reconstruction and development; and
- Democratisation of South Africa (http://www.polity.org.za/polity/govdocs/rdp/rdp2.html).

- **Growth, Employment and Redistribution (GEAR)**

The Growth, Employment and Redistribution (GEAR) strategy was proposed to rebuild and reconstruct the economy in accordance with the set goals of the RDP. The GEAR was structured to meet basic needs; develop human resources; and increase participation in the democratic institutions of civil society, hence executing the vision of the RDP (Visser 2004: 6). The RDP was, however, terminated in a White Paper on reconstruction and development. The termination was partly due to a currency crisis in February 1996 when the value of rand dropped by more than 25% (Visser 2004: 7).

In order to stabilise the domestic capital and foreign currency markets, the government launched a conservation macro-economic strategy, "Growth, Employment and Redistribution" (GEAR). This initiative was developed by a technical team comprising 15 policy makers which consisted of personnel from the Development Bank of Southern Africa, the South African Reserve Bank, three state departments, academics and two representatives of the World Bank (Visser 2004: 8). Visser (2004: 10) alleged that the GEAR macroeconomic strategy did not live up to the expectation of planners as the economy grew by only 2.7% between 1996 and 2001 as compared to the forecasted 6% growth. Furthermore, employment shrank by 3% between these years.

- **Integrated Sustainable Rural Development Programme (ISRDP)**

The Integrated Sustainable Rural Development Programme (ISRDP) was rolled out by former President Mbeki in January 2001 (Department of Provincial and Local Government 2003: 1).

The main objective of the ISRDP was to achieve integrated sustainable development amongst the most rural communities in South Africa. The ISRDP was the first governmental initiative which impelled multi-sectoral governmental departments, parastatals and other organisations co-operating in an effort to address the rural development backlogs in the node (Department of Provincial and Local Government 2003: 1). Everatt, Dube and Ntsime (2004: 2) acknowledged that the ISRDP was a grassroots driven initiative to underpin development in the some of the most rural and poverty stricken South African rural communities in 2001. These districts include ((Everatt *et al.*, 2004: 2):

- Sekhukhune
- Umkhanyakude
- Ugu
- Zululand

- Umzinyathi
- O.R Tambo
- Chris Hani
- Central Karoo
- Kgalagadi
- Maluti A Phofung
- Alfred Nzo
- Ukhahlamba
- Bohlabela

Everatt *et al.*, (2004: 2) also mention that the ISDRP was a local demand driven developmental strategy propelled to empower local government authorities in providing the fulcrum around which sectoral departmental delivery would be coordinated; targeted at enabling an integrated and responsive rural development and growth. Worth mentioning is that Umkhanyakude (where the area under study is situated) was listed among the prioritised poverty stricken districts in 2001. However, 13 years later, it still ranks amongst the poorest districts in South Africa (The KwaZulu-Natal Provincial Growth and Development Plan 2012: 52).

- **White Paper on Public Service Delivery (Batho Pele)**

According to Hemson and Roberts (2009: 12), Batho Pele was launched in 1997 as the framework to institute a new service delivery ethic in the South African public sector. This was consonant with the constitutional principles which uphold the efficient, economic and effective use of public resources in a manner that is development-oriented and responsive to the populace demand. Hemson and Roberts (2009: 12) acknowledged that Batho Pele constituted the inner core of the White Paper on Transforming Public Service Delivery and which set out to allow

citizens living below the poverty line to hold government officials accountable. Hemson and Roberts (2009: 12) further mention that *"the vigorous adoption of these democratic principles resulted to a discernable break between the over-centralised, hierarchical and rule-bound systems inherited from the previous dispensation and set out mechanisms for accountability; the focus has shifted to delivery on Batho Pele at the municipal tier of government"*. It can be deduced from the Batho Pele principle that when government officials are held accountable by people they govern, it can possibly result in better service delivery, which may underpin rural development.

The eight principles of Batho Pele are itemised below (Hemson and Roberts 2009: 12):

1. Consultation
Citizens should be consulted about the level and quality of the public services they receive and, wherever possible, should be given a choice about the services that are offered.

2. Service standards
Citizens should be told what level and quality of public services they will receive so that they are aware of what to expect.

3. Access
All citizens should have equal access to the services to which they are entitled.

4. Courtesy
Citizens should be treated with courtesy and consideration.

5. Information
Citizens should be given full, accurate information about the public services they are entitled to receive.

6. Openness and transparency

Citizens should be told how national and provincial departments are run, how much they cost and who is in charge.

7. Redress

If the promised standard of service is not delivered, citizens should be offered an apology, a full explanation and a speedy and effective remedy; and when complaints are made, citizens should receive a sympathetic, positive response.

8. Value for money

Public services should be provided economically and efficiently in order to give citizens The best possible value for money (http://www.dpsa.gov.za/batho-pele/docs/information%20 Briefs/Overview%20of%20accessibility%20study.pdf).

- **The Rural Development Strategy of the Government of National Unity**

This was released as a discussion document in 1995. However, renewed efforts to design a rural strategy were launched under the auspices of the Rural Task Team of the RDP office. This process led to the publication of The Rural Development Framework by the Department of Land Affairs in May 1997. The document, however, draws attention to the need for the co-ordination of rural development.

The range of initiatives that emerged from the different government departments were not based on a specific set of targets or common indicators. Nevertheless they did address important elements of rural development (http://www.info.gov.za/otherdocs/2000/isrds.pdf). The implementation of rural development takes place in the context of a specific legal framework consisting of many pieces of legislation. Important amongst these are:

• The Constitution of the Republic of South Africa, Act 108 of 1996;

• Housing Act No 107 of 1997;

• Restitution of Land Rights Act No 22 of 1994;

• Development Facilitation Act No 67 of 1995;

• Extension of Security of Tenure Act No 62 of 1997;

• Transformation of Certain Rural Areas Act No 94 of 1998;

• Abolition of Racially-based Land Measures Act No 108 of 1991; and

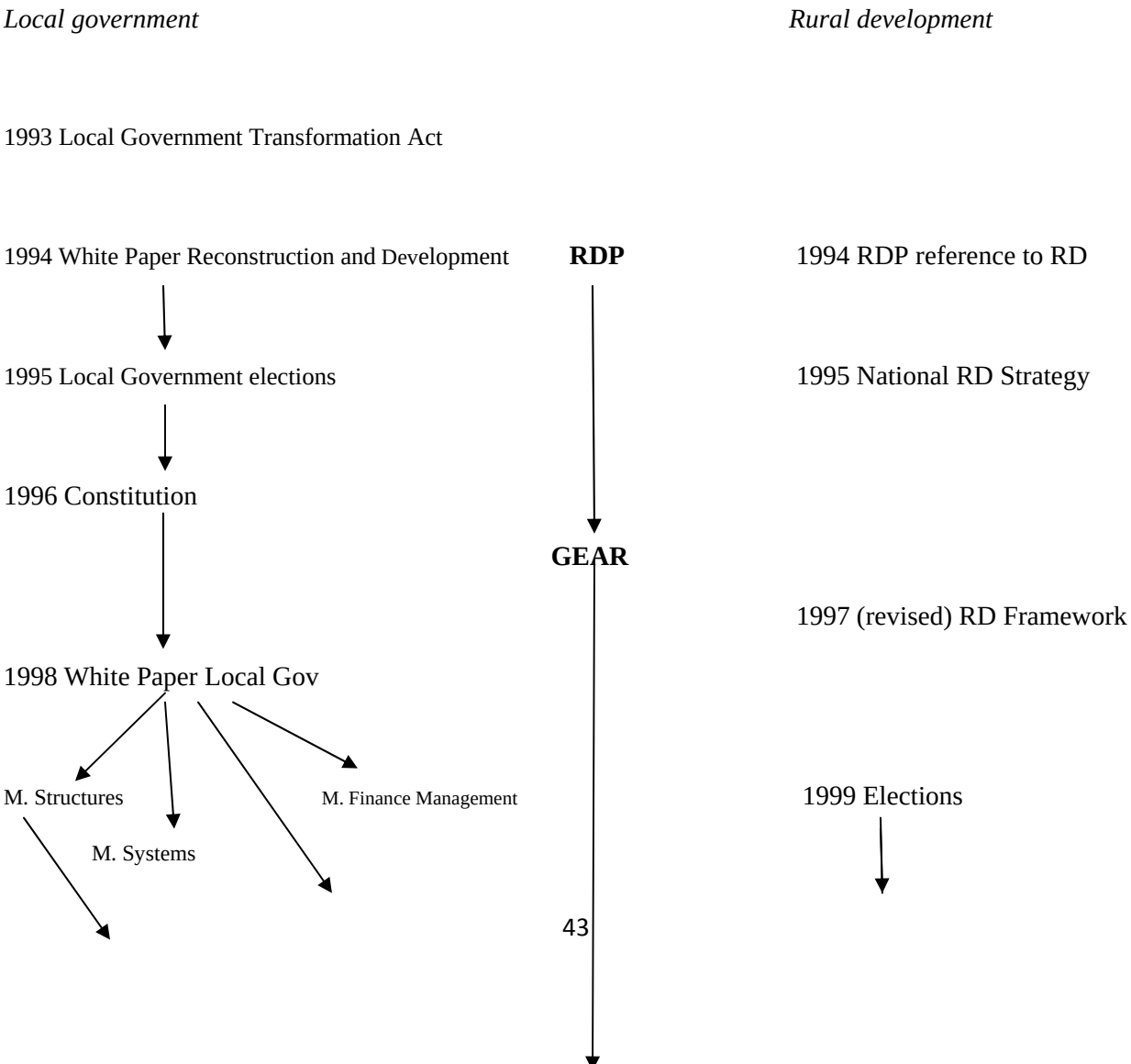
•Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (http://www.info.gov.za/otherdocs/2000/isrds.pdf).

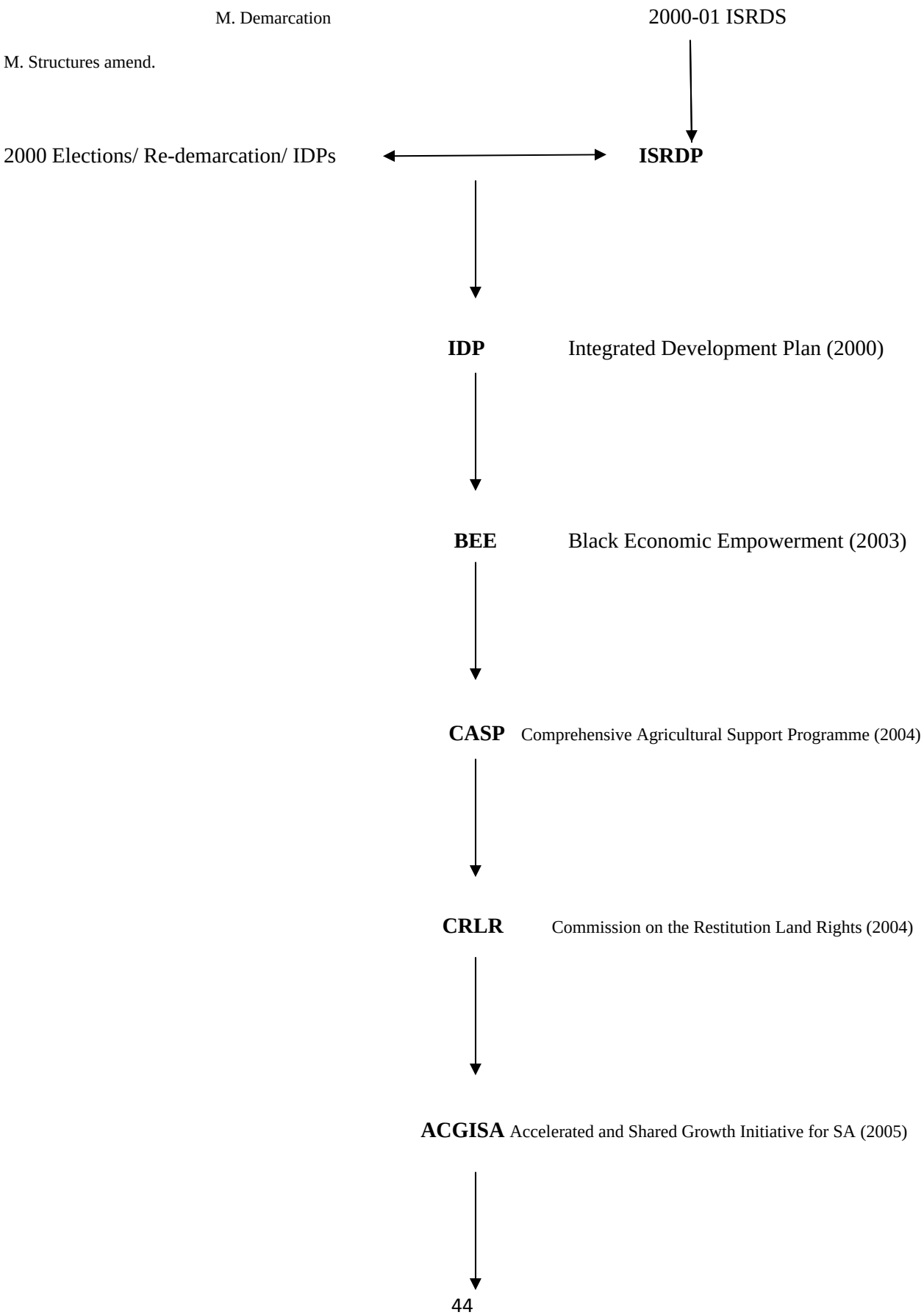
No 108 of 1997: Water Services Act, 1997 (http://www.dwaf.gov.za/Documents/Legislature/a108-97.pdf).

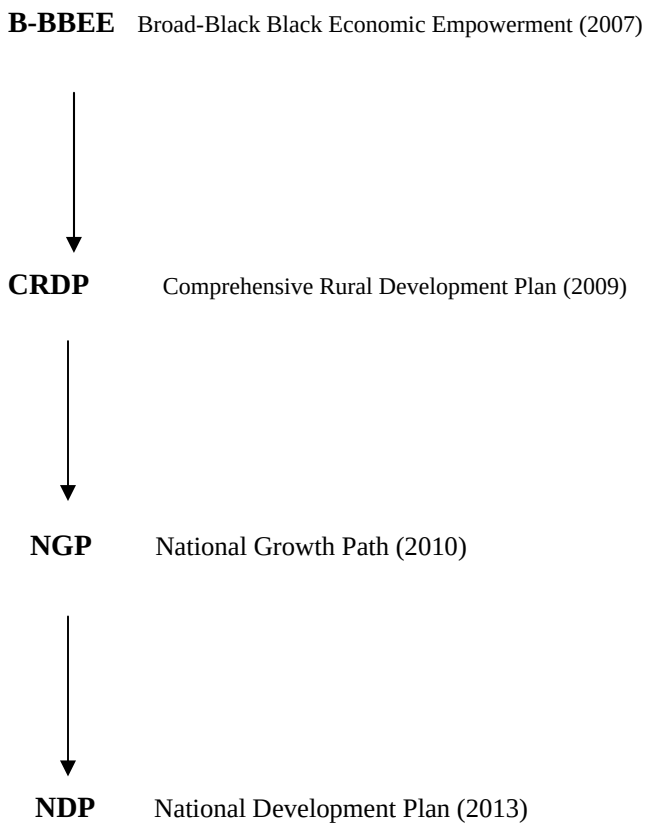
Despite the efforts made by the government to revamp the agricultural sector, the impact has not been felt by the subsistence farmers of Mtubatuba. The Initiator of Hlaneni Landscape farm project, Mrs. Magwaza (2013, 19 July) reveals that the farmers in Ward 19 and surrounding areas still farm in harsh conditions, resulting in poor yields of farm produce. Empirical studies (Maduna *et al,*. 2013: 6) reveal that government policies have not had a significance positive influence on subsistence farmers at the grassroots level. Maduna *et al.,* (2013: 6) and Agri-South Africa (2013: 2) substantiate this argument when they state that policies such as the Extension of Security of Tenure Act No 62 of 1997, Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) and Restitution of Land Rights Act, No 22 of 1994 has not had a resonant impact on subsistence farming as no significant growth and development have been recorded at

grassroots level in the past few years. Rather, this sector has recorded a decline of 2.9 % (Statistics South Africa 2013: 2).

Figure 2.1: Chronology of policies and approaches to Local Government and Rural Development in democratic South Africa (between 1993 and 2014)




M. Demarcation
2000-01 ISRDS
M. Structures amend.
2000 Elections/ Re-demarcation/ IDPs
ISRDP
IDP
Integrated Development Plan (2000)
BEE
Black Economic Empowerment (2003)
CASP
Comprehensive Agricultural Support Programme (2004)
CRLR
Commission on the Restitution Land Rights (2004)
ACGISA
Accelerated and Shared Growth Initiative for SA (2005)



Legend [M= Municipality]

Source: Adapted from Perret (2004: 2); Rural Development and Land Reform (2011: 410); Department of Rural development (2013: 3-5)

Figure 2.1 provides a summary of two parallel policy streams in the South African democratic dispensation since 1994. It illustrates local government (LG) on one hand, and rural development (RD) on the other. The figure further depicts the gradual establishment and strengthening of LG as the third constitutional sphere of government. The second stream which highlights RD illustrates the various policies, legislations and programmes enacted by the South African government over the years. The figure also highlights the following eras: Local Government Act (1993), first democratic election (1994), first local elections (1995), adoption of a constitution (1996), WP Local Government (1998), second local elections, re-demarcation process as well as the introduction of the IDP; all of which took place in 2000. The second stream (rural

development) highlights the following eras: RDP (1994), National RD Strategy (1995), revised RD Framework (1997), elections (1999) and the launch of the ISRDP in 2000. Furthermore, Figure 2.1 shows a trend and linkage between the RDP, GEAR and ISRDP. The Integrated Development Plan (IDP) was established in 2000 mainly to fast track development amongst rural municipalities across South Africa. In 2003, the South African government launched Black Economic Empowerment (BEE) as a strategy in empowering the disadvantaged black populace. The BEE was intended to reduce the inequality gap that had existed over several decades in the country (Department of Rural development 2013: 5; www.sahistory.org.za). To further underpin development, more particularly in rural communities, the Comprehensive Agricultural Support Programme (CASP) was launched in 2004. The CASP was forecasted to accelerate agricultural development amongst rural farmers as a means of reducing poverty and creating a better standard of living. Also, in the same year, the Commission on the Restitution of Land Rights (CRLR) was established to settle land disputes and transfer land ownership to some blacks who were previously forcefully driven out of their land (Rural Development and Land Reform 2011: 410). In 2005, GEAR was replaced by the Accelerated and Shared Growth Initiative for South Africa (ASGISA). The ASGISA envisioned the following goals: poverty reduction by 2010 and halving unemployment by 2014 from 28% in 2004 to 14% by 2012. The ASGISA builds on the foundations of the RDP's goals of building a united, democratic, non-sexist and non-racial society, and a single integrated economy (www.sahistory.org.za). The Broad-Based Black Economic Empowerment (B-BBEE) was launched in 2007 to further develop the BEE that was launched in 2003. After identifying some setbacks in BEE, this (B-BBEE) was restructured to address these impediments to BEE in order to address the socio-economic imbalances (www.sahistory.org.za). In 2009, the Comprehensive Rural Development Plan (CRDP) was

primarily set up to curb poverty across the rural communities of South Africa, which was mainly driven by rural municipalities, to curb poverty. The CRDP entails land reforms, building individuals and households, as well as the community as a whole. It principally deals with basic human needs and providing the required social infrastructure to improve access to service delivery. Furthermore, the CRDP is equally designed to improve the land tenure system and offer strategies in developing livestock and sustaining poor crop yields during drought seasons (Department of Rural development 2013: 3-5). After the reign of president Thabo Mbeki, ASGISA was replaced by the New Growth Path (NGP) by president Jacob Zuma's administration in 2010. The NGP was envisaged to accelerate growth in the South African economy; address the high unemployment rate and inequality; reduce poverty and contribute to the achievement of higher levels of economic growth. Lastly, the South African government launched the National Development Plan (NDP) in 2013 as South Africa's long-term socio-economic development roadmap. The NDP is viewed as a policy blueprint for eliminating poverty and reducing inequality in South Africa by 2030. To address the country's socio-economic disparity, the NDP identifies the key challenges to faster growth, amongst other things, and presents a roadmap to a more inclusive economy (National Development Plan 2011: 3).

2.4.2.7 Developmental support strategies by the KwaZulu-Natal provincial government

This section provides an overview of strategies that the present administration has used in addressing the rural underdevelopment in KwaZulu-Natal. The Department of Rural Development and Land Reform (DRDLR) of the KZN Province has initiated 8 development support strategies in its rural development framework (Department of Rural Development and Land Reform 2013: 15-21). The strategies are discussed briefly below:

- **Integrated Development Planning (IDP)**

Local municipalities in South Africa use this approach to plan future development in their areas. Due to the poor administration of rural communities during the apartheid era, which resulted in underdevelopment and poor service delivery, the IDP was designed to accelerate development in these communities. The new approach to local government is envisaged to overcome the poor planning of the apartheid regime. The IDP involves the entire municipality, as well as citizens in finding the most suitable means to achieving a long term and sustainable rural development. The stakeholders in the IDP process are:

- Municipality

The IDP serves as a framework for the developmental agenda of local municipality.

- Councillors

The IDP offers councillors the privilege to make decisions based on the needs of their constituencies.

- Communities and other stakeholders

The IDP is also based on communities' desires, top priorities and aspirations. It provides the opportunity for stakeholders to participate in the groundwork and enactment of the development plan.

- National and provincial sector departments

Governmental services are often delivered at the local municipalities through the provincial and national government departments. Such services include police stations, clinics and schools. For

this reason, it is imperative for departments to be involved in the IDP process in orders to be guided on how best to allocate resources in addressing the needs of the municipality.

The IDP process

The purpose of the IDP process plan is to ensure that the entire process is well planned and executed. The IDP process plan is outlined as follows:

- How the public can participate and structures that will be created to ensure this participation;
- Time schedule for the planning process;
- Who is responsible for what; and
- How the process will be monitored.

At District Council level, a framework is developed in consultation with all local municipalities within the district. This framework ensures co-ordination, consultation and alignment between the district council and local municipalities. The framework will guide the development of the IDP Process Plan for each local municipality.

The process undertaken to produce the IDP consists of 5 phases:

Phase 1: Analysis

During this phase, information is collected on the existing conditions within the municipality. It focuses on the types of problems faced by people in the area and the causes of these problems. The identified problems are assessed and prioritised in terms of what is urgent and what needs to be done first. Information on the availability of resources is also collected during this phase.

At the end of this phase, the municipality will be able to provide:

- An assessment of the existing level of development;
- Details on priority issues and problems and their causes; and
- Information on available resources.

Phase 2: Strategies

During this phase, the municipality works on finding solutions to the problems assessed in phase one. This entails:

- Developing a vision -

The vision is a statement of the ideal situation the municipality would like to achieve in the long term once it has addressed the problems outlined in phase one.

- Defining development objectives

Development objectives are clear statements of what the municipality would like to achieve in the medium term to deal with the problems outlined in phase one.

- Development strategies

Once the municipality has worked out where it wants to go and what it needs to do to get there, it needs to work out how to get there. A development strategy is about finding the best way for the municipality to meet a development objective.

- Project identification

Once the municipality has identified the best methods to achieving its development objectives, it can identify specific projects.

Phase 3: Projects

During this phase, the municipality works on the design and content of projects identified during Phase 2. Clear details for each project have to be worked out in terms of:

- Who is going to benefit from the project?
- How much is it going to cost?
- How is this project going to be funded?
- How long would it take to complete?
- Who is going to manage the project?

Clear targets are set and indicators worked out to measure performance as well as the impact of individual projects.

Phase 4: Integration

Once all projects have been identified, the municipality has to check again that they contribute to meeting the objectives outlined in Phase 2. These projects will provide an overall picture of the development plans. All the development plans must now be integrated. The municipality should also have overall strategies for issues like dealing with AIDS, poverty alleviation and disaster management. These strategies should be integrated with the overall IDP.

Phase 5: Approval

The IDP is presented to the council for consideration and adoption. The Council may adopt a draft for public comment before approving a finalised IDP (http://www.etu.org.za/toolbox/docs/localgov/webidp.html).

- **Reformed Communal Tenure System**

This is aimed at transforming the communal tenure system of rural KZN**.** Some areas within the rural community are identified as having challenges relating to governance, economic and social issues. One major concern is the present state of economic affairs in communal communities due to the unsettled tenure issues. The existing economic state of affairs in communal communities is as a result of the unsettled tenure issues. The co-existence of the democratically elected and traditionally elected leaders, as well as the non-elective leaders such as the Royal House-succession, is in disharmony. The communal tenure reform approach designed by the DRDLR intends to harmonise the leadership structure found in these communities for a better communal tenure system. Such reformation is required in the area under study as the community is led by both traditional and democratic elected leaders.

- **Rural Development Agency (RDA)**

As mentioned by the Department of Rural Development and Land Reform (2013: 17), the RDA is proposed as an agenda to be formed at the state level. It aims to mobilise, coordinate and manage resources; provide funds for rural projects; as well as business cooperatives. In addition, the RDA intends to develop the existing developmental entities rather than creating new developmental bodies. By developing the existing developmental agencies, resources will be saved and the duplication of roles by such establishments will be minimised. This model has two basic components (DRDLR 2013: 17), namely:

- a development component ; and

- a funding component. The RDA utilises these models to ensure the proper execution of rural projects and the strengthening of business entities, while fast tracking rural development.

- **The Animal and Veld Management Programme**

This programme was initiated to sustain the land use practices in rural KZN. The poor management of veld and overstocking has resulted in low production and deterioration of grazing fields, soil and water. The policy document reveals that the present institutional structure is unfavourable for rural farmers. Hence, the Animal and Veld Management Programme is designed to address the following (Department of Rural Development and Land Reform 2013: 21):

- Soil rehabilitation;
- Re-greening the village space; and
- Decongesting the village space.

- **The River Valley Catalytic Programme (RVCP)**

The RVCP is aimed at integrating water planning and management in the rural communities of KZN. The programme focuses on (Department of Rural Development and Land Reform 2013: 21);

- **Human resource development of communities along the rivers banks –** This programme will involve the development of human resources among rural communities living

or deriving their means of livelihood along the rural banks. This will mainly involve communities located around the north eastern and south eastern parts of KZN. However, the area under study may not benefit from this agenda as there are great distances between the rivers in KZN and this farming community.

- **Soil and land management –** This programme is intended to curtail the fast declining soil fertility, as well as making maximum usage of land for cultivation and rearing of live stock.
- **Water management –** The water management scheme is designed to curtail the water shortages in the agricultural and other productive sectors which require water for their sustainability in rural KZN.
- **Crop management –** This programme is designed to manage crop production and enhance crop yield so as to improve food security, as well as generating additional income through crop production amongst rural farmers in KZN.
- **Afforestation –** A successful scheme of this programme will enhance forestation and reduce the depletion of soil. This will improve soil fertility and create a healthier environment.
- **Livestock management-** Significant evidence reveals that most livestock production is found in rural towns or villages across KZN. The successful implementation of this scheme will transform into better livestock production and better a standard of living amongst livestock farmers. It is a value-add for farm and non-farm activities along the river banks (Department of Rural Development and Land Reform 2013: 21).

2.4.2.8 Other initiatives by the provincial government in KwaZulu-Natal

Besides the aforementioned developmental strategies proposed by the Department of Rural Development and Land Reform(DRDLR), the KZN administration has taken the following steps towards tackling underdevelopment in rural KZN. The initiatives are explained briefly below:

1. Operation *Sukuma Sakhe*

This was proposed by the government to undertake '*war on poverty*'. It is a comprehensive strategy aimed at addressing the basic needs of rural KZN. Operation *Sukuma Sakhe* is described by the Department of Rural Development and Land Reform (2013: 3) as *a multi-sectoral, multi-departmental and multi-stakeholder partnership strategy* designed to achieve the 14 Outcomes of the Presidency's National Outcomes Approach. The Presidency's National Outcomes Approach was designed to ensure that the South African government is determined in realising the anticipated real improvements in the life of all citizens. This outcome approach specifies the precise and intended aim of government, how the plans are expected to be achieved, and how to verify whether the plans are being achieved (www.thepresidency.gov.za/dpme/docs/guidelines. pdf). The Operation *Sukuma Sakhe* also aims to ensure that citizens at the ward level are empowered, with full participation of all stakeholders at grassroots level (Department of Rural Development and Land Reform 2013: 3).

2. Local Economic Development (LED)

The term LED was coined out of a deliberate effort to enhance economic development in communities that are marginalised and require much of government's attention. Over time, government at district level has developed and modified different approaches to the LED in response to the fast trend of the global economy. Local Economic Development has been developed *beyond a preoccupation with local self-sufficiency towards understanding, developing and exploiting economic linkages from district and national, through to the global level* (Draft Provincial LED Guidelines 2008). The strategic objective of establishing LED is to

"*promote economic growth and development of local economies in partnership with key stakeholders and by aligning LED initiatives with government programmes"* (Department of Economic Development and Environmental Affairs 2004: 4).

The LED involves policy frameworks designed to promote the rural economy. These policy frameworks include the Intergovernmental Relations Framework (IGRF) and White Paper on Local Government. They are intended drivers to the slow growth of the rural economy in South Africa. This framework offers expert advice and financial support to small scale businesses in rural areas (Department of Rural Development 2013: 3**).**

3. Rural development and land reform

The Constitution, through the Bill of Rights, has taken steps in the direction of restoring human and socioeconomic rights to the previously marginalised black race. The majority of the rural dwellers in South Africa are black and such an action by the government will no doubt have an inverse effect on this populace. Through legislation and institutional arrangements, the legislative arm of the South African government has been able to establish legal and institutional infrastructure aimed at restoring the rights of previously displaced Black South Africans, thereby spurring development. These legislative arrangements range from the national level to local government. It ranges equally from spatial planning to traditional leadership and governance legislation (Department of Rural Development and Land Reform 2013).

Specifically, the legislation has resulted in land redistribution of about 6 million hectares of land for agricultural purposes from 1994 till the present. Also, a total of 95% of land claims have been settled of the 79, 696 land dispute cases (South African National Development Plan 2011: 195).

The government further reconciled land disputes through the enactment of the Black Communities Development Act, 1984 (Act No. 4 of 1984). This Act gave the privilege to Blacks "*to acquire a 99-year leasehold secured by registration on residential land in urban areas outside the homelands"*.

Furthermore, section 6-8 of the Constitution, Act 108 of 1996, address the land inequality as follows:

Section 6- A person or a community whose tenure of land is legally insecure as a result of past racially discriminatory laws or practices is entitled, to the extent provided by an Act of Parliament, either to tenure which is legally secure or to comparable redress;

Section 7- A person or community dispossessed of property after 19 June 1913 as a result of past racially discriminatory laws or practices is entitled, to the extent provided by an Act of Parliament, either to restitution of that property or to equitable redress; and

Section 8- No provision of this section may impede the state from taking legislative and other measures to achieve land, water and related reform, in order to redress the results of past racial discrimination, provided that any departure from the provisions of this section is in accordance with the provision of section 36 (1) (Department of Rural Development and Land Reform 2013: 6-7). However, land availability does not pose a threat to rural development in the area under study as farmers have sufficient land on which to cultivate their crops.

4. Comprehensive Rural Development Programme (CRDP)

This is similar to the Rural Development and Land Reform approach which is intended to curb under development in rural communities. However, the scope of CRDP extends beyond land

reform. The CRDP entails building individuals, households and the community as a whole. It principally deals with basic human needs and providing the required social infrastructure to improve access to service delivery. Furthermore, the CRDP is designed to improve the land tenure system and offer strategies in developing livestock and sustaining poor crop yields during drought seasons. If adequately implemented, this can result in growth in the rural economy. Amongst its objectives are the provision of essential economic infrastructure, development of small scale businesses, improved market access and provision of credit facilities to qualified individuals in rural communities.

The CRDP comprises three phases (Department of Rural Development and Land Reform 2013: 8):

Phase I: Meeting basic human needs (shelter, energy, food, water and sanitation)

Phase one is a short term plan aimed at providing decent housing to poor rural communities. The newly built homes will have sanitation facilities, electricity and potable water. Also, in an attempt to reduce hunger and ensure food security, the CRDP set up specific programmes to address these challenges.

Phase II: Rural enterprise development

The CRDP initiated this medium term plan in order to develop the present small scale businesses, as well as supporting the creation of new small scale businesses.

Phase III: Rural industries, markets and credit facilities

This is a long term plan intended to enhance the rural economy, whereby the small scale businesses could be transformed into larger businesses. Also, Phase three of the CRDP intends to

promote a rural-urban market development through provision of credit facilities by the government, with the overall agenda of generating more jobs and reducing poverty.

2.4.2.9 Challenges affecting rural development

Before the 1994 election which brought an end to the apartheid regime, rural administration was run by traditional authorities. The traditional leadership was often not accountable to any superior government official. This resulted in stagnation of development in many rural communities across South Africa (Department of Rural Development and Land Reform 2013: 17). In the last two decades, the foremost challenge of rural development has been the issue of fighting the marginalisation of the disadvantaged rural dwellers (South African National Development Plan 2011: 195). Fighting marginalisation necessitated changes in access to land, water, education, skills, rural infrastructure and other basic services provided by the government to urban residents (South African National Development Plan 2011: 195). However, some advancement has been made in the last few years with some significant shifts in the extent and level of poverty in rural South Africa. Research conducted by the National Income Dynamics Study (NIDS) in 2009 reveals that between 1993 and 2008, a rural share of poverty fell from 70 percent to 53 percent (South African National Development Plan 2011: 195). The significant improvement in welfarism among these disadvantaged households of the rural community is mostly attributed to the large increase in social grant expenditure by the South African government. As the government recognised that a high proportion of rural populace were engaged in subsistence farming, policies were made in favour of such farmers; as workers and tenants benefitted by receiving better wages (South African National Development Plan 2011: 195).

The main rural development challenges are categorised into two segments, namely, the internal and external challenges affecting rural development.

- **Internal challenges affecting rural development**

The challenges facing rural development as stated can be traced back to the historic apartheid discrimination and forceful removal of the black populace into the former homelands. The homelands were overpopulated, resulting in limited resources and poor service delivery (http://www.polity.org.za/polity/govdocs/rdp/rural2.html). Till today, some former homelands still experience the hardship faced during the apartheid era; such as poor service delivery and underfunding. Rural municipalities are usually underfunded as they lack the expertise to package proposals which will enable them to access funds to finance required projects (Department of Rural development 2013: 7). In addition, the poor state of service delivery is attributed to a lack of financial resources, incompetent personnel and a lack of long-term planning, as well as poor maintenance of infrastructure such as pipes for reticulation. Furthermore, the spatial distribution of households which are often scattered makes it uneconomically viable by the government to take up projects in such areas (South Africa 2013:12-13).

A common backlog in rural communities is the inadequacy in the sewage disposal system. The lack of this service exposes rural communities to diseases, as well as pollution of ground and surface water. At present, many schools, taxi ranks and other public facilities in rural communities across KZN lack sanitation facilities, which undermines human dignity (South Africa 2013: 15-16).

The Department of Rural Development (2013: 6-7) also highlights the following as factors impeding development in rural KZN:

- A lack of entrepreneurial insight amongst rural communities;

- A lack of entrepreneurial support and micro-finance;
- Low levels of agriculture production;
- A lack of access to markets due to inadequate infrastructure (road, storage for farm produce, etcetera) and inadequate support from government;
- A lack of funding for Local Economic Development (LED) in rural municipalities;
- A lack of skills to participate and compete in a variety of economic activities; and
- The shortage of agro-processing and agri-businesses in rural areas of KZN. The aforementioned factors have slowed down the pace of rural development in KwaZulu-Natal.

Hence, these factors have undermined the development in rural KZN.

- **External challenges affecting rural development**

Rural development is also constrained by several external factors. One such factor is the availability of tarred roads. The non-existence of tarred roads, as well as the poor state of roads in some rural locations of KZN have a direct bearing on accessibility, thereby increasing vehicle operational costs on such routes. Consequently, the existing primary national routes are currently being maintained. Nevertheless, there is traffic congestion along these routes as additional lanes need to be provided. Due to budgetary constraints, the secondary feeder and local connectors are not adequately maintained. Owing to the settlement pattern amongst the rural community of KZN, government is not encouraged to utilise limited resources in constructing adequate and suitable roads for these deprived communities (South Africa 2013: 8). The same inadequacy of infrastructure also applies to rail transportation. This impedes rural development as an efficient rail service could be used to transport fresh farm products from rural KZN to urban areas, amongst other products and services.

Rail transportation

The rail mode of transportation could also serve as a cheap mode of transportation of passengers, linking the main nodes in KZN (South Africa 2013: 8). The rail network connecting rural areas has continuously degraded, while many branches have closed down due to poor maintenance. Furthermore, changes in haulage policies had an adverse effect on the rail mode of transportation as this resulted in a shift from rail to road transportation (South Africa 2013: 9). The poor maintenance and policies in the rail system had a distorting effect on the viability of agriculture in rural areas across KZN.

Water

Water is a vital resource. Usage extends from domestic to agriculture and manufacturing to industrial, amongst other uses (South Africa 2013: 11). This resource, however, is insufficient for domestic, agricultural and other uses amongst households of rural KZN. Several rural communities do not have access to water resources and are dependent on surface water. During the dry winter period, the groundwater naturally becomes the next available option. Surface water and groundwater are, however, susceptible to climate change.

Subsistence and commercial farming

Subsistence and commercial farming, as well as mining and tourism, is highly dependent on water availability for their respective development and growth. This indicates that the development of rural KZN is jeopardised by the lack of water, not only from a domestic perspective, but also from an economic perspective (South Africa 2013: 11). A backlog still exists in the development of water resources, purification and distribution of potable water in

rural KZN, more particularly at the north-eastern regions where the area under study is situated (Ward 19 in Mtubatuba Municipality) (South Africa 2013: 11).

Lastly, the lack of Information Communication Technology (ICT) in rural areas has slowed down the pace of development in rural KZN. Information Communication Technology can facilitate a knowledge-based workforce and create an innovative economy, thereby reducing divergence in rural communities (South Africa 2013: 21-22).

2.5 Case of KwaZulu-Natal

According to the South African National Development Plan (2011: 22), a threat exists due to the incapability of the state to execute the plan. This implies that for plans to be successful, there should be willingness and capability amongst the executioners of the purported plan (South African National Development Plan 2011: 22).

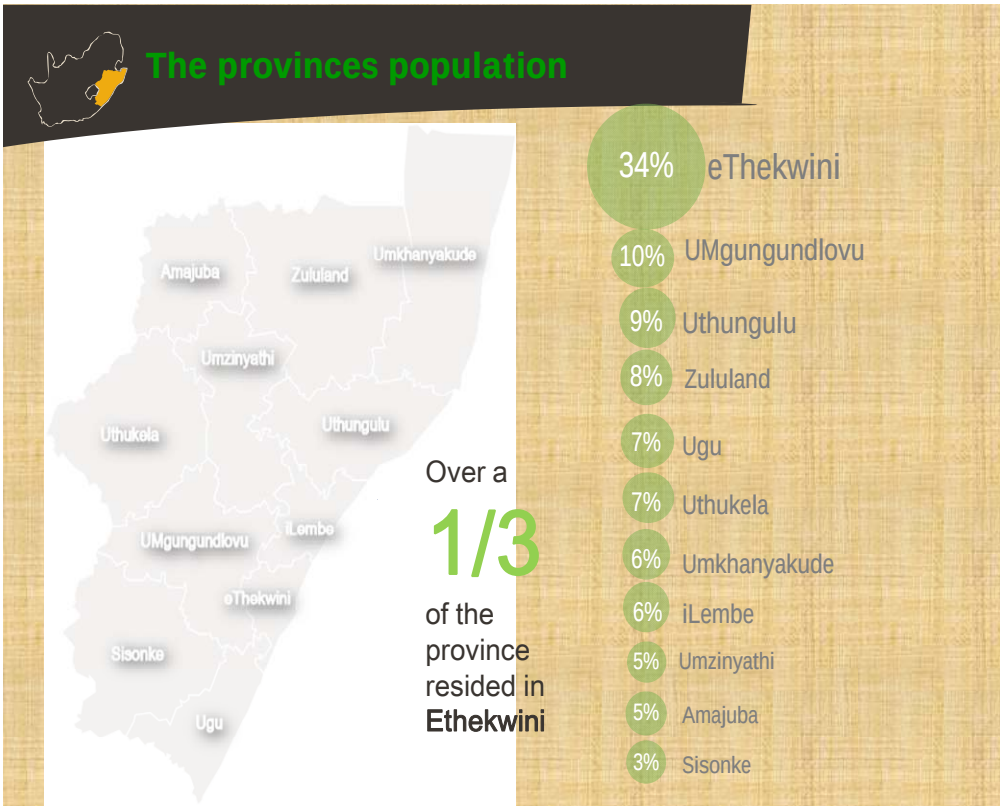
2.5.1 Rural areas and development in KwaZulu Natal

Rural areas are communities mainly found in the former homelands created by the apartheid regime. These settlements are often sparsely populated on large land surface areas whose economic survival is often dependent on external transfers from their relatives working and living in urban areas, as well as social grants from the government (Ngomane 2012: 10). Satge (n.d: 2), on the other hand, explains that there is no accepted legal definition to this but states that in the Western Cape Province, using a "*measure of less than 150 persons per square kilometre*" gives a description of what a rural area is. However, in this study, rural areas are defined as "*areas in which people farm or depend on natural resources, including villages and small towns and large settlements created by apartheid removals which depend on migratory labour and remittances for survival*" (National Rural Development Framework 1997 cited by Bacus 2013:

20). The framework further explains “rurality” as a mode of living, state of mind and peoples’ culture and tradition where farm land, domestic animals and a settlement are involved.

According to Bacus (2013: 17), 41 percent of the South African population dwell in rural areas. The most recent census, which took place in 2011, estimate the country’s population at 50 586 757 people. Among this, an approximated 10 819 128 inhabitants were from the Province of KwaZulu-Natal (KZN); accounting for 21.4 % of the national population. Furthermore, an estimated 49.7% of the residents of KZN live in rural areas, while the remaining 50.3% live in urban areas (Maduna, Dlamini, Msimang, Mbizeni and Chetty 2013: 2).

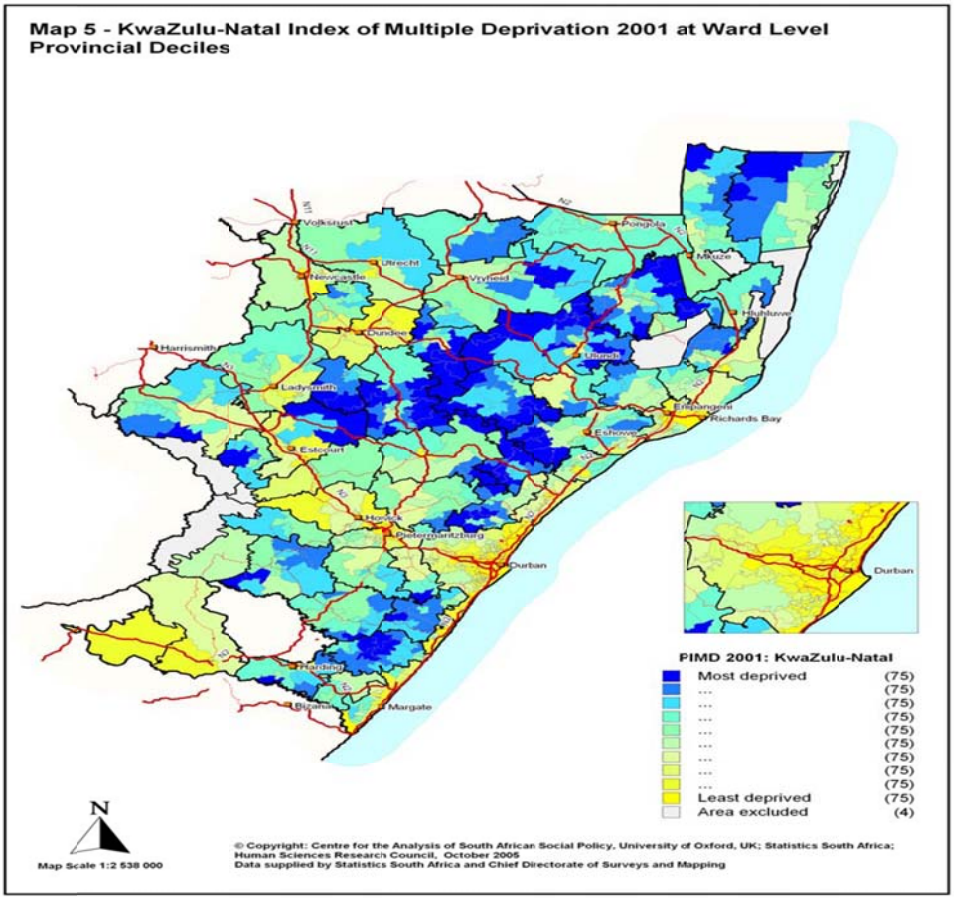
Figure 2.2: Percentage of people living in rural KZN



Source: Adapted from Department of Rural Development and Land Reform (2013: 13).

KwaZulu-Natal is the most rural province, with associated poor rural infrastructure and service delivery backlogs (Department of Rural Development and Land Reform 2013: 3). These settlements are often characterised by high levels of poverty. According to Bacus (2013: 15), an estimated 5 million individuals in KZN are living in poverty, which constitutes a poverty level of 49.5%. The major cause of the prevailing poverty can be traced to the legacy of the 1913 Natives Land Act (Department of Rural Development and Land Reform 2013: 4) which expelled the majority of Black South Africans from their land and was the first among other discriminatory laws that led to the marginalisation of the Black race (DRDLR 2013: 4).

Figure 2.3: High Level of multiple deprivations in KwaZulu Natal



Source: Bacus (2013: 31)

Multiple deprivation

As shown in Figure 2.3, the most deprived regions in KwaZulu Natal are found in the north eastern as well as central parts of the province, where Ward 19 is located. According to Townsend (1987 as quoted by Noble, Barnest, Wright and Roberts (2008: 2), multiple deprivation is defined as "unmet needs across different aspects of social and economic life". Noble, Barnest, Wright and Roberts (2008: 3) are of the opinion that multiple deprivations are not a distinct form of deprivation but "a combination of specific forms of deprivation". They further argue that deprivation is conceived in a broad perspective by considering issues relating to income, employment, health, education and the quality of the environment in which people live. Multiple deprivation arises when a populace are deprived of a number of attributes such as income, employment, housing, healthcare, education, etc (http://www.thebicyclingguitarist.net/studies/geog_glossary.htm). These traits of multiple deprivation are, however, common features in Ward 19 of the Mtubatuba Municipality. Although Figure 2.3 depicts the deprivation at ward level as at 2001, there has been no significant difference till the present, as many of these deprived communities still have not fully benefitted from the dividends of the democratic dispensation (Department of Rural Development and Land Reform 2013: 13).

To reduce the gap of inequality facing the previously marginalised Black populace, the South African government utilised various reforms such as the Redistribution Programme and the Accelerated Shared Growth Initiative for South Africa. Despite these efforts, high levels of poverty and inequality still persist (Seekings 2010: 7-8). In fighting the war on inequality, the government provides grants to thousands of individuals on a monthly basis, while others depend on family members living and working in urban areas to sustain a living (Maduna, Dlamini, Msimang, Mbizeni and Chetty 2013: 8). However, the income received is often insufficient to

cater for their daily needs and, in order to sustain their livelihood, many of these marginalised community members are dependent on subsistence farming.

In bridging the gap between the underdeveloped rural KZN and their urban counterpart, the government has provided a number of households with basic services. However, those households serviced in rural KZN are less than 50 percent of the entire rural populace of KZN. Much still needs to be done to further enhance the standards of living amongst the populace, who have inadequate services. These service delivery targets were constrained by the lack of infrastructure in the rural communities and also due to the remote rural settlement pattern. There was no appropriate delivery equipment or technology to offer services to people involved (Department of Rural Development 2013: 11).

As revealed by the Department of Rural Development (2013: 13), there is poor coordination of rural development planning, resourcing, execution and follow up processes. To address this concern, the KZN provincial government has set up a Medium Term Strategic Framework (MTSF) to address this issue in order to realise the desired results (Department of Rural Development 2013: 13). Moreover, the human settlement is not well coordinated as there was no initial town planning before the construction of homes in these communities. The local government officials are tasked with the planning function, while the housing function is assigned to government officials at the provincial level. Also, the responsibility for the provision of water and electricity is assigned to those responsible for bulk services and reticulation. In addition, there is poor coordination amongst the contractors installing water reticulation infrastructure and those responsible for providing bulk infrastructure. Ideally, these two teams should work together. A well-coordinated human settlement plan should shift to the level at which the planning is been executed. This implies that such planning and execution should be

assigned to officials at the municipal level (South African National Development Plan 2011: 14).The realities in rural areas and the broad variations in providing service delivery to this deprived community have not been adequately recognised (Department of Rural Development 2013: 15).

From the above evaluation, a “one-size fits-all” approach used by the government will not necessarily curb the underdevelopment in rural KZN. Although some of these rural settlements may have similar challenges, they require different approaches in improving the standard of living. For this reason, the researcher proposes water resource management as a strategy in enhancing the development and growth of subsistence farming in the area under study, thereby improving their standard of living.

2.5.2 Role of subsistence farming in rural KZN

The agricultural sector plays a significant role in employment creation in KZN. KwaZulu-Natal has a comparative advantage over other provinces. It receives the highest amount of rainfall, and also has a comparative advantage in terms of land and labour resources. The province produces 30% of the country’s agricultural output, while on a provincial level, the agricultural sector contributes 4.4% to the provincial Gross Value Added (GVA)**.** Furthermore, the growth in the manufacturing sector can be attributed to produce from the agricultural sector. The manufacturing sector relies on produce such as beverages and tobacco in the food industry, while the wood and paper industry are heavily reliant on pulp tree, all of which are produce from the agricultural sector.

As stated earlier, the South African agricultural sector consists of commercial and subsistence farming. The two, however, are interlinked in some regard and, due to the complexity involved,

the merits of the agricultural sector are divided into both types of farming. This implies that the overall growth and contribution of the national agricultural sector will comprise both the commercial as well as subsistence farming. In addition, the sector contributes to economic growth, which includes the procurement of local capital equipment and consumables.

As at 2011, the agricultural sector had contributed above 7.5% to total employment in all districts besides Amajuba and eThekwini in KwaZulu-Natal. Above 12% of dwellers in uMzinyathi and Sisonke were gainfully employed through this sector. iLembe has 11%, while the Ugu, Zululand, uMkhanyakude and uThungulu districts were above 9% (Commission of Inquiry into Provincial Growth and Development 2013: 18). This implies that farming significantly contributes to the source of livelihood amongst the populace of rural KZN.

Though a sizeable number of people are employed through commercial farming, subsistence farming still serves as the main source of livelihood amongst many dwellers of rural KZN (Mr Myeza, Extension Officer to the Department of Agriculture, Environmental Affairs and Rural Development, Mtubatuba Municipality). Evidence given by Mr Myeza also supports this statement when he mentioned that more than 60 percent of households in the Mtubatuba Municipality (located in the north eastern part of KZN) are involved in subsistence farming. He also stated that a high percentage of households in Ward 19 are involved in subsistence farming as a means of livelihood. A majority of the residents are uneducated and lack the required skills to compete for the limited job opportunities in Mtubatuba Municipality. Most of the households farm mainly for food security. Some of the residents of this community claim food produced through subsistence farming are a form of income. Also, they consider farming to be a part of their lifestyle. Households often make great attempts during the rainy summer period to store

much food. This is to serve as backup in case they do not have sufficient income to buy food items during the dry winter period.

According to Baiphethi and Jacobs (2009: 7), households access food mainly through three sources, namely:

1. Food purchases in the market place;
2. Subsistence production; and
3. Transfer from public programmes or other households.

A random survey conducted by Baiphethi and Jacobs (2009) in this poor community revealed that very few food items are purchased from the market place, while more than half of foods consumed are produced from their farms. Some also claim they seldom receive few food items through neighbours.

Janvry and Sadoulet (2011: 477-479) and Baiphethi and Jacobs (2009: 459-461) argue that subsistence production provides nutritional benefits. It serves as fresh food consumption for the household, and it is also a means of saving income that might have been spent on nutritious foods the farmers might not be in a position to produce. They further mention that home consumption increases the availability of fresh vegetables and provides an opportunity to increase micronutrient intake. The income saved from producing food by household seems to have a more positive contribution on the nutritional status of residents of a rural community. Income saved could be subsequently used to purchase energy dense foods such as fats, oil and meat. In a survey conducted amongst the rural households of KwaZulu-Natal which comprises the Mtubatuba Municipality to discern the relationship between the incidence of stunting among children and the agricultural practices of their households, researchers concluded that "*agricultural activities make a positive contribution to household nutrition, which suggests that*

designing effective programmes for improving agricultural productivity in the less-developed areas of South Africa could have a potentially positive impact on household and child nutritional status"(Kirsten and Vink1998: 586).

Subsistence farming contributes economically to deprived communities. Without this mode of farming, many among the population are likely to be unemployed. Considering the contribution of subsistence farming to food security in rural South Africa, more attention should be provided by government at grassroots levels.

Umkhanyakude District Municipality (Ward 19 falls under this district) happens to be the district with the highest rate of unemployment in KZN. This highlights that the importance subsistence farming in such a community cannot be overemphasised, as the members of the households are likely to be left with almost no other option as a means of livelihood.

In addition, subsistence farming serves as a means of food production to many amongst these household. In periods when Umkhanyakude receives its highest amounts of rainfall, December and January, subsistence farmers are able to produce more food. Hence, they spend less on food purchases.

Table 2.1: Unemployment rates of districts in KwaZulu- Natal

	Unemployment Rate (Official)		Youth Unemployment 14 – 35 Years	
	2001	2011	2001	2011
KwaZulu-Natal	49,0	33,0	58,4	42,1
Ethekwini Metropolitan Municipality (ETH)	43,0	30,2	53,1	39,0
Ugu District Municipality	53,3	35,2	61,8	45,1
uMgungundlovu District Municipality	46,3	30,4	55,6	39,5
Uthukela District Municipality	58,8	39,6	67,7	49,3
Umzinyathi District Municipality	62,5	36,6	70,6	45,6
Amajuba District Municipality	55,3	39,1	65,4	50,3
Zululand District Municipality	60,8	41,1	69,2	51,2
UMkhanyakude District Municipality	62,8	42,8	69,9	51,2
Uthungulu District Municipality	50,3	34,7	59,4	44,4
iLembe District Municipality	48,0	30,6	55,8	37,2
Sisonke District Municipality	56,9	36,0	65,7	44,4

Source: Adapted from Bacus (2013: 16)

As illustrated in Table 2.1 above, 42.1% of the youth of KZN are unemployed. Some researchers (Averbeke 2008, Bhatti, Koike and Nasu 2012) have come to the conclusion that if agriculture is well harnessed, it has the potential to generate a considerable number of jobs in KZN within the short term. In the medium-term, the sector can support labour-intensive farming activities to create more job opportunities. This implies that the government will have to direct it efforts into labour intensive means of job creation, as opposed to mechanised farming. If this is achieved, it will be a positive step towards addressing the poverty in rural KZN. Despite the above, subsistence farming currently faces several constraints which have an adverse effect on poverty (Commission of Inquiry into Provincial Growth and Development 2013: 18).

2.5.3 Impediments to subsistence farming

A number of factors have slowed down the pace of development and growth of subsistence farming in rural South Africa. These impediments to the development of subsistence farming in rural communities across South Africa range from water scarcity in dry farming communities to lack of farming implements (Aliber and Hart 2010: 436).

Some of the impediments are discussed hereunder:

- **Water**

According to Morrison, Morikawa, Murphy and Schulte (2009: 6), water is highly important in almost every sector. Sectors such as the agricultural sector have heavy reliance on this resource. Nevertheless, water is becoming scarcer on a global scale and there is every indication it will become even scarcer with the passage of time. The significance of this valuable resource cannot be overemphasised in rural South Africa as it is the life blood for subsistence farming. Morrison and Corona (2013: 1) affirm that water is an essential resource for life its economic value is inestimable. This statement is concurred with by Puste, Tanuj, Mandal, Gunri, Banerjee, Dasgupta and Maiti (2013: 1) who emphasise the importance of water when they state that water is the most fundamental and vital natural resource whose quantity is fixed and not renewable. They further mention that water plays a significant role in the growth of every sector.

Empirical studies (Brown 2008 cited by Rasmussen 2009: 24; Blignaut and Heerdeny 2009:1) reveal that water scarcity is often attributed to the climate change effect. According to Mati (2007: 4), the most vulnerable people to climate-related disasters are the poor smallholder farmers (subsistence farmers). This is as a result of their inability to access cutting-edge knowledge, afford inputs or utililise appropriate technologies that can mitigate natural disadvantages such as the negative effect of climate change.

- **Climate change**

Thorlakson and Neufeldt (2012: 3-4) also argue that South Africa's climate, as well as the relative scarcity of water experienced in most farm lands, and the low potential of arable land available to subsistence farmers often results in risky crop production. This further exacerbates the level of poverty amongst rural subsistence farmers as they are compelled to purchase costly inputs which ties down their capital. Morrison, Morikawa, Murphy and Schulte (2009: 9) concur with Thorlakson and Neufeldt's view when they state that the most adversely affected people by climate change are rural farmers. They substantiate their argument with the fact that rural subsistence farmers depend only on irregular rainfall which is worsened by climate change.

- **Lack of farming tools/ assets**

Another constraint to the development of subsistence farming is the lack of farming tools. In instances where farmers had access to crop land, they could not maximise land usage as they lack the implements and other resources to cultivate. In a study in the Eastern Cape, it was observed that even when resources were pooled amongst five rural households, equipment required were still not met (Fraser *et al.,* 2003 cited by Aliber and Hart 2010: 436). According to Baiphethi and Jacobs (2009: 18), household assets are considered major determinants of the ability of subsistence farmers in agricultural production and to secure a livelihood through subsistence farming. They further state that the lack of assets for agricultural usage is predominant in sub-Saharan Africa, as evidenced by unviable small and falling farm sizes and poor-quality land.

- **Health services and education**

In addition, Baiphethi and Jacobs (2009: 18) assert that poor health services and education further limit development and growth of farming and access to other livelihood options. They argue that the health condition of farmers often determines their level of productivity. Furthermore, they explain that due to low levels of literacy amongst rural dwellers, they are unable to maximise the benefits obtainable from technological advancement in agricultural sciences.

- **Farm murders**

Goldblatt (2010: 23) ranks farming in South Africa as the world's most dangerous profession. He based his argument upon the high rate of murder of farmers in South Africa. Goldblatt further mentions that the murder rate of farmers has increased by 25% since 2005. Evidence provided by the independent South African Human Rights Commission quantifies the murder rate of farmers at 2,500 deaths per annum. If this challenge of murder of farmers is not curbed, it poses a risk to the future growth of farmers across the nation.

- **Alien plants**

Studies by Blignaut and Heerdeny (2009:1) also point out the adverse effect that the prevalence and spread of invasive alien plant species, such as Lantana camara and Cromolina, have on water scarcity. These alien plants consume high amounts of water and compete with crops for the limited water. Invasive alien plants are common features in the case study. Though the community in the last 5 years has uprooted several alien plants, it still poses a threat to crop yield.

- **Pollution**

When interviewed on the 18th February 2013, Mr Madlala (Deputy Director, Water Sector Regulation, Department of Water Affairs, Durban) acknowledged that many of the water resources are being polluted by industrial effluents, domestic and commercial sewage, acid mine drainage, agricultural run-off and litter. He further mentioned that the major pollutant to the water resource in Mtubatuba Municipality is Tendelecoal Mining (Pty) Ltd. The mining company's activity contaminates the water resource, making it unsuitable for domestic and agricultural purposes. Hence, water pollution drastically reduces water availability.

- **Rural-urban migration**

Another considerable challenge to the development of subsistence farming is rural-urban migration. Many rural dwellers migrate to cities in search of better opportunities. This invariably reduces the labour force available for farming in rural places. Goldsmith, Gunjal and Ndarishikanye (2003:5) assert that "*economic theory and empirical research have shown that the foundation of rural-urban migration is the excess of the urban wage over the rural wage*". As there are higher chances of receiving a better paying job in urban centres, many of the dwellers of rural communities have relocated to urban centres in search of better job opportunities to sustain their living.

From a broader perspective, the following factors were also identified as constraints to the development of subsistence farming in KZN:

- **Inadequate access to funding for infrastructure**

Subsistence farmers in rural communities lack infrastructure such as storage facilities to preserve their farm products.

- **Ineffective linking of graduates to farms**

Students who studied agricultural-related disciplines are often not linked to subsistence farmers. Such linkage will have an inverse effect on subsistence farming (Commission of Inquiry into Provincial Growth and Development 2013: 17).

- **Land reform process**

The bureaucracy involved in land reform has been an impediment to the development of subsistence farming. Much of the land which was allocated to white South Africans during the apartheid era are yet to be returned to the rightful land owners (Commission of Inquiry into Provincial Growth and Development 2013: 18).

- **Access to Ingonyama Trust Board (ITB) Land for agricultural production**

The difficulty, faced by subsistence farmers in rural communities in accessing the ITB has slowed down the pace of growth and development of this mode of farming. Similar to the land reform process, the ITB also involves bureaucracy (Commission of Inquiry into Provincial Growth and Development 2013: 18).

The aforementioned constraints have ripple effects on the growth and development of subsistence farming in rural KZN. For instance, the water insufficiency results in poor crop yield which has discouraged many farmers from engaging in this mode of farming. According to Mr Thobelani Mchunu (Soil Scientist, Department of Agriculture, Environmental Affairs and Rural Development, Mtubatuba Municipality**)**, there is insufficient water in Mtubatuba Municipality, alongside other municipalities in KZN, due to low amounts of rainfall. This water shortage has constrained agricultural production over the years. The water insufficiency is more observable between the months of May and August. As a result of water scarcity, subsistence farmers in the study area consider it risky to attempt to produce most of the exotic crops. This, however,

stagnates the growth of subsistence farming as farmers are dissuaded from planting certain crops. They are limited to specific crops which will not require much water for its yield. Crops such as spinach are often cultivated, which are low value crops, as compared to high value crops such as potato. Consequently, in circumstances such as the scenario depicted, subsistence farmers engage in more intensive and diverse practices and crops in order to reduce risk, while ensuring food security in the household (Aliber and Hart 2010: 436).

As pointed out earlier in this study, subsistence farming has been shown to be important for rural household food security. The productivity is, however, quite low and, in some cases, it has been a discouraging factor leading to the abandonment of agricultural production by rural households (Baiphethi and Jacobs 2009: 18). Due to this, many subsistence farmers have gone to urban centres in pursuit of domestic jobs.

It is important to identify and address the aforementioned challenges as research by Taigbenu, Ncube and Boroto (2010: 5) has shown that a strong relationship exists between food insecurity, poverty and access to productive water and land. The living standards of poor smallholder farmers can be drastically improved if they are impacted with the skills and tools for managing water, even under rain-fed agriculture, so that their crops receive adequate water from the time of planting to that of harvest. In that way, crop failures are minimised and crop yields can be increased with the associated benefits of improved incomes and livelihood (Taigbenu *et al*.,2010: 5).

Water re-allocation from irrigated agriculture to urban and industrial sectors is inevitable in the future. It is unlikely to attract the undesirable social consequences of unemployment in the agricultural sector if the water being re-allocated is not sustainably and efficiently used for

agriculture. New water conservation technologies such as rainwater harvesting offer the hope that the optimal use of water for agriculture will reduce the threat of food crises. Appropriate policies, including water pricing, are needed to provide a framework to support the new era of sustainable water resources management in the agriculture sector (Taigbenu *et al*.2010: 9).

2.6 Water resource management

2.6.1 Definition

Snellen and Schrevel (2004: 11) define water resource management as "*a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"*. Bhatti, Koike and Nasu (2012: 1) view water resource management as "*a cost effective strategy; contributing to the economic prosperity and poverty reduction through several pathways, while strengthening systems and capacity for longer-term climate risk management*."

Water resource management is considered to be based on the perception that water is an integral part of the ecosystem, a natural resource which is a social and economic good and whose quantity and quality determines the nature of its usage (Snellen and Schrevel 2004: 9).

Snellen and Schrevel (2004: 14) further explain that managing water resources implies "*redirecting human activities in ways that satisfy both human and ecosystem needs."* They argue that in managing limited water resources, there are no other options besides utilising water resources management. They further recommend fundamental changes in peoples values, beliefs and perceptions about efficient water usage. Efficient water usage is not the responsibility of water institutions only but that of stakeholders as well. However, in achieving this, the progress will be difficult and slow.

Taigbenu *et al*., (2010: 2) gave a similar definition to that of Snellen and Schrevel but also they point out the need to reserve water for future generations. They define water resource management as a process that promotes a coordinated approach to the development and management of national and regional water, land and related resources with the sole aim of achieving equitable access to, and sustainable use of these resources by all stakeholders, while at the same time maintaining the integrity of these resources for use by future generations.

2.6.2 The importance of water resource management in rural South Africa

Many studies have explained the importance of water accessibility to the development of rural communities in South Africa (Moeletsi and Walker 2011: 428; Taigbenu *et al*., 2010: 9). Water plays a variety of roles in these marginalised communities. The role played by this resource range from domestic to agricultural; employment generation to impact on health. It also has an impact on the lifestyle of females, amongst many other uses.

According to Kaliba, Norman and Chang (2003: 3), successful agricultural development projects rely on a stable supply of water. Some projects have been unsuccessful due to an insufficient supply of water. Studies on poverty assessment have shown the correlation between sufficient water and agricultural development in rural communities. Kaliba *et al*., (2003: 3) further substantiate their argument by justifying how the improvement of the water supply plays an integral role in designing and implementing an effective and efficient strategy for poverty alleviation. Besides the usefulness of water for agriculture in rural communities, Moriarty and Butterworth (2003: 11) also explain its importance for domestic use. In most rural communities across South Africa, women are responsible for water collection from sources which are often several kilometres from their places of residence. This time spent in water collection could have been used for other productive activities or leisure.

A report by UNESCO (2004: 1) reveals that women and young female children spend more than 10 million people-years carrying water from far sources of water supply to their homes annually. While on such trips, many women have been abused, and in some instances, they face the risk of being raped (Crow and Sultana 2002: 3). A report by UNESCO (2004: 1) draws the attention of health organisations to the adverse effect caused by the non-availability of water on women and young girls involved in fetching water. Diseases such as anaemia and other similar diseases are common amongst this group (Swedish International Development Cooperation Agency (SIDA) 1997, cited in UNESCO 2004: 1). Research has shown a strong correlation between improved health and sufficient water, which in turn has a direct relationship with development (Fox and Liebenthal 2006: 271). A study by Wenhold and Faber (2008: 38) also highlights the corresponding relationship between water availability and better nutrition. As observed, several studies have indicated access to water as having an inverse effect on communities' health standard. In this context, access to water could be one of the driving forces in improving the health of the rural populace of South Africa, are often seen as being in a poor state of health as compared to their urban neighbours. In addition, the sufficiency of water in rural communities will result in more job opportunities, thereby increasing level of income, improved standard of living and decline in poverty rates. This view is buttressed by Bresciani and Valdés (2007: 7) when they state that water availability for agricultural purposes often generates employment for unskilled labour in rural communities.

Bearing in mind the aforementioned significance of water to rural communities, the available quantity has to be maximised, whereby each drop is used in the most productive manner. Though the focal point in the present study is on subsistence farming, water needs to be accessible for other activities, thereby leading to simultaneous and gradual development and growth in each

sector of the affected community. If water is available for a certain activity while being unavailable for other activities, it creates an imbalance in the social and economic lifestyle of the community (Muller 2009: 6; Morrison *et al.*, 2009: 3; Jayne *et al.*, 2010: 9). The Ward 19 community does not have sufficient water for domestic purpose which makes it a much bigger challenge to obtain water to sustain their crops during dry seasons.

As asserted by Mr Myeza, some Municipalities in South Africa do not have sufficient funds to finance irrigation projects for rural farmers. This has undoubtedly made the farmers apply traditional water conservation techniques such as mulching to sustain their crops during drought periods. Mr Myeza further explains that this water conservation technique is passed down from one generation to the next. However, in recent times, due to poor rainfall in the Mtubatuba Municipality, along with the declining soil fertility, subsistence farmers are unable to sustain their crop yields through the traditional conservation techniques used 5 years ago. It is for this reason that a more technologically advanced water resource management practice is required in the area under study. Taigbenu *et al*. (2010: 9) suggested new water conservation technologies such as rainwater harvesting which is capable of optimising the use of water for agriculture, thereby reducing the threat of a food crisis. They further recommend appropriate policies and water pricing, which are of importance in providing a framework that will support the new era of sustainable water resources management in the agriculture sector.

2.6.2.1 Requirements for successful water resource management

Achieving successful water resource management will involve different sectors, departments and stakeholders working in the same direction. The involvement of these sectors, departments and stakeholders, as depicted in Figures 2.1 and 2.2, is imperative for successful water resource management. It will require experts in water management, engineers, policy makers and end

users. The expertise and experiences of these personnel are required as their working together tends to have a high potentiality of resulting in a successful water resource management. Additional capital is also required for infrastructural development in order to curb the leaking of pipes (Averbeke 2008; Bhatti *et al*., 2012; DWA 2012). Experts with an in depth knowledge of water management are also required to enact sustainable policies which will be beneficial in the short and long run (Bacus 2013: 13-14). Due to the shortage of experts in water management, more people need to be trained to fill up the gap (DWA 2012: 18). Lastly, continuous awareness is required to sensitise the populace on water resource management, as this will lead to effective usage.

2.6.2.2 The major threats to water resources in South Africa

Water is debatably the most valuable resource in South Africa (Pitman 2011: 659). This resource is, however, threatened by both human activities and nature. One such threat is the level of pollution of rivers across the country. There has been a continuous deterioration in the water quality of South Africa's main catchments (Vaal, uMngeni, Crocodile River and Olifants) which poses a risk to human and livestock health, as well as on other agricultural products (Dzwairo 2011: 30). The mining activities in some parts of the country are largely attributed to the high level of pollution (Dzwairo 2011: 32). Pollution of the water resource also arises from agricultural run-off of fertilisers and dung from dairies and piggeries. This is of great concern to the government and consumers; since, the more polluted this resource is, the higher the treatment costs (Davis, Zunckel and Ntanzi 2012: 38). The accumulated cost of water treatment is transferred to customers through higher tariffs (Dearmont, McCarl and Tolman 1998: 5).

Secondly, the invasive water plants have been a pollutant to the water resource of South Africa for several decades (Blignaut 2007: 28). These invasive alien species are mostly found in the

coastal zones of the country, such as in the KZN Province. South Africa has one of the biggest challenges in relation to alien plant invasion globally, as it costs the government millions of rands on a yearly basis to uproot them. Species such as *Lantana camara* are capable of damaging the ecosystem through their excessive consumption of water, light and oxygen. Alien plants also alter physical resources, namely: habitat, sediment, light and water (Richardson and Wilgen 2004: 47-48).

Thirdly, the soaring rate of emission of carbon dioxide has an adverse effect on climate change. Climate change invariably has been cited by many researchers as one of the greatest threats to the country's water resource (Council for Scientific and Industrial Research 2009: 69), Water Research Commission (2009: 24), Zhu and Ringler (2010: 9)). This is mainly due to the nation's high energy intensive usage in the industrial sector; as South Africa is ranked the 12th largest carbon dioxide emitter in the world (South African National Development Plan 2011: 100).

Furthermore, as acknowledged by the South African National Development Plan (2011: 140), the South African economy is electricity driven, and due to this, the emission of carbon dioxide similarly contributes disproportionately to climate change.

Climate change has the capability of deteriorating the ecology and worsening the scarcity and pollution of water. A recent climate change model forecasts more availability of water (for agricultural purpose) in Asia and North America. On the contrary, less water availability (for agricultural purpose) in South Africa as well as amongst the sub-Saharan African nations, Latin American and the Caribbean (South African National Development Plan 2011: 67).

2.6.2.3 Challenges for water resource management

The challenges for water resource management in South Africa could be categorised into present and future challenges. Ongoing issues such as the lack of routine and preventative maintenance of water infrastructure is considered to be one of the current challenges (South African National Development Plan 2011: 157). Presently, due to financial constraints, most small and medium municipalities such as Mtubatuba have no preventive maintenance scheme for water infrastructure. Lack of routine maintenance can have grievous effects on the infrastructure, which often results in the higher cost of maintenance in some circumstances. The maintenance, however, is only carried out when a major fault is detected (South African National Development Plan 2011: 157). Maintenance also requires skilled personnel which is lacking in the country. In the words of Herold (2010, cited by Pitman 2011: 662), the steady decline of essential, skilled personnel is a major threat. For instance, only 39% of DWA's engineering positions were filled in 2008. Between 2008 and the present, some of these engineers have retired, which exacerbates the state of affairs of water resource management. Herold (2010 cited by Pitman 2011: 662) further reiterates the South African National Development Plan (2011: 157) assertion when he mentioned the poor maintenance of infrastructures. He further highlights the high quantities of unmetered water being lost on a daily basis, which is a concern to a water scarce country such as South Africa. Many studies (Averbeke 2008; Bhatti *et al*., 2012; DWA 2012; and CSIR 2010) have also identified insufficient funding as a present constraint to the development of water resource management in South Africa. If this trend continues, the consequences will cut across the agricultural sector and other sectors as well. On the other hand, as cited by different studies (Snellen and Schrevel 2004; Richardson and Wilgen 2004), a future challenge to water resource management is the effect of climate change. Population increases

have a direct link to food production. Industrialised food production is a significant factor resulting in climate change, as well as the destruction of the biodiversity. The pace at which industrialised food is being produced far outruns the development of water resource management. In bridging this gap, more investments and training of personnel needs to be taken as a priority by the government.

2.6.2.4 Effects of poor water resource management

Huge gaps still exist between water resource management approaches and how water resource planning is been performed and what needs to be done (Bhatti, Koike and Nasu 2012: 4). Bhatti *et al*. (2012) further states that the present water-use projection indicates clearly that by 2025, water demand will exceed supply under a business-as-usual scenario. They are of the view that climate variations and changes, coupled with low water storage capacity, are likely to aggravate this challenge. They conclude by recommending sustainable management through developing, allocating and utilising water resources efficiently. Sustainable management of water resources is therefore a process element of sustainable human development and can address poverty and proffer a better standard of living, while the opposite of this could result in poverty stricken conditions of individuals, particularly amongst rural subsistence farmers farming in water scarce regions.

Poor water resource management will have a negative effect on the future of a country, especially on the agricultural sector which is responsible for above 70 percent of water usage in most of sub-Saharan countries, which includes South Africa (Taigbenu *et al*., 2010: 4). This is because the agricultural sector will be expected to increase its food production with a reduced quantity of water. This is a challenge for generations to come (Taigbenu *et al*., 2010: 3).

As argued by Bhatti *et al*., (2012: 4), Pakistan is a country battling with a water crisis, not because of physical scarcities of water resources but due to poor water resources management. For several decades, a lack of knowledge, experience, technology and coordination amongst different institutions has been a major challenge for the water sector of Pakistan. As suggested by Bhatti *et al. (*2012: 1) "*empirical evidence shows that better management coupled with effective policy, intensified political will, appropriate investments, awareness, climatic change adoption and institutional strengthening are promising pathways for sustainable water resources management"*. The consequence of water mismanagement in Pakistan has resulted in food insecurity.

A similar occurrence to that of Pakistan took place in Australia. The water-related challenge in Australia was also due to poor water resource management. The impact of the prolonged drought in Australia had a negative impact across several sectors, especially the agricultural sector. The level of resilience of a country's water resource management system can only be measured in times of severe drought (South African National Development Plan 2011: 154-155). To avoid a replication of this situation in South Africa, water resource management requires adequate attention.

2.6.3 The importance of water resource management for subsistence farming and rural development

Several studies have been conducted on water resource management in relation to subsistence farming in water scarce farms across Africa **(**Falkenmark 2013**;** Aliber and Hart 2010**)**. Most of these regions are often the sub Saharan African countries such as Kenya, Tanzania and Mozambique, which share similar climate attributes with South Africa. Such common

similarities include rainfall pattern, aridity and topography, amongst others. The agricultural natural resource in most of these regions is rather insignificant. According to the Food and Agricultural Organisation (FAO) 1993 cited by Mati 2007: 1), the mean annual rainfall ranges between 100mm to about 1,500mm, with most regions having infertile soil to sustain crop yield. The researchers often adapt or develop the local techniques used by the farmers in these locations. For instance, in semi-arid countries like Ethiopia, which are often characterised with steep slope farm lands, researchers adopt (or develop) water conservation techniques such as Bench terraces. This technique is prepared by re-shaping a steep slope into flat beds, separated by vertical risers which are made on steep slope farm lands. Over the years, the Bench terrace technique has resulted in better crop yields (Mati 2007: 6). Besides individual researchers, organisations such as the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) have conducted several studies in the same field. This non-political organisation comprises ten member nations, which include Burundi, the Democratic Republic of Congo (DRC), Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, United Republic of Tanzania and Uganda.

The studies conducted in this field are often centred on improved crop yield and maximum usage of water, with direct linkage to poverty reduction. Calzadilla *et al.,* (2013: 21) are of the opinion that, due the poor management of water usage (for agricultural purposes), several opportunities to increase food security and household income are missed. On the contrary, research carried out amongst farmers from the Eastern and Southern African region reveals that the farmers are aware of some of the technologies and approaches for managing water for farming purposes. However, this skill, experience and technicality are unevenly spread across different communities, while

some are in publications (Mati 2007: v). This implies more awareness and cross fertilisation of information, knowledge and skill needs to be exchanged amongst subsistence farmers.

Many researchers have made significant contribution to the field of water resource management for subsistence farming (Taigbenu *et al*., 2010; Averbeke 2008; Calzadilla *et al.*,2013; Thorlakson and Neufeldt 2012). One group of researchers is Bhatti *et al*., (2012) who suggest strategies and approaches through which water resource management in farming could create pathways for sustainable economic growth and poverty eradication. In their study, they argue that water resource management techniques are capable of improving crop yield and making the best use of every available drop of water. Calzadilla *et al., (*2013: 20) argue that several potentials are untapped by not utilising water resource management strategies on farm lands. An example of such untapped potential is one expounded by Mati (2007: 3). He argues that several potentials are untapped for green water recapitalisation. In addition, he mentioned the 38 million ha of land available for cultivation of crops. Of this 38 million ha, on only an estimated 3 million ha of land is water management being practised, whereas, the region's full potential is at 18 million ha. These lands are found in low income countries within the Eastern and Southern African region, which would benefit the population of such countries if utilised appropriately.

Falkenmark (2013: 2), in his study, points out the importance of water resource management when he asserted that the most populated latitudes in the world are water scarce. He further mentions that water for agricultural purposes in water scarce regions is more dominating than other regions of the globe. Falkenmark (2013: 11) offers suggestions on curbing water scarcity through water management. Amongst the strategies he explained were the desalination of saline water, recycling of waste water, virtual water and food trade, an increase in agricultural yields and improved water use efficiency in agriculture, including the use of biotechnology.

Bhatti *et al*.**, (**2012: 12) offered analyses on the significance of green water in rain-fed agriculture. They explained the usefulness of green water by linking the relationship between low rainfall and poverty.

In a study conducted by Wani *et al.,* (2003a, 2011a,b cited by Wani *et al.,* (2012: 361), comparison was made between the yields of crops grown through advanced water conservation intervention (integrated water resource management) and traditional practice. It was noted that the advanced water conservation intervention's yield was fivefold higher as compared to those grown through traditional means. Wani *et al.,* (2012: 364) criticised the policy on water resource management. They argue that the policy focuses on irrigational method as a means of improving the agricultural sector with insufficient support for rain-fed agriculture. The indication from comprehensive evaluation shows that there is a pressing need for a widening of the policy scope to incorporate explicit approaches for water management in rain fed agriculture.

Molden *et al.,* (2007: 21) assert that the world's available land and water resources can satisfy future demands if the following steps are taken:

1. Upgrading rain fed agriculture by investing more in rain fed agriculture to enhance agricultural productivity (rain-fed scenario);
2. Discarding the artificial divide between rain-fed and irrigated agriculture and adopting integrated water resource management approaches for enhancing resource efficiency and agricultural productivity;
3. Investing in irrigation for expanding irrigation where scope exists and improving efficiency of the existing irrigation systems (irrigation scenario);

4. Recycling wastewater (grey water) for fodder and food production after suitable treatment;
5. Conducting agricultural trade within and between countries (trade scenario); and
6. Reducing gross food demand by influencing diets and reducing postharvest losses, including industrial and household waste.

As stated by Wilk and Jonsson (2012: 710-711), great potential exist in water resource management for agriculture, which is un-recognised and undeveloped amongst Southern African countries.

In conclusion, several studies have justified the importance of water resource management in sustaining subsistence farming in water scarce communities across South Africa and Africa as a whole. Such management is essential in the area under study in order to enhance subsistence farming thereby developing rural agriculture through water, hence reducing poverty.

2.6.4 Water resources in South Africa

South Africa was classified as a water-stressed country in the 1990s but is presently considered as a water scarce country (South African National Development Plan 2011: 228). South Africa has an average rainfall of about 450mm, which is less than the global average of 860mm per annum. Amongst 206 countries, South Africa is ranked as the 29th driest country (UNESCO-WWAP 2006 cited by Muller, Schreiner, Smith, Koppen, Sally, Aliber, Cousins, Tapela, Merwe-Botha, Karar and Pietersen 2009: 5).

Water resources in South Africa are from natural sources, surface water, as well as ground water. The natural sources include rainfall, snow, hail and sleet. Surface water is accumulated through a direct runoff from precipitation - rainfall and snow. Ground water is the fraction of precipitation

that infiltrates the soil. This drains into the root zone of crops and a significant amount of water is stored in the place referred to as the zone of saturation (http://www.kmwsa.gov.in/o-m_manual/). KwaZulu Natal has a host of rivers. They are the Mooi River, Imfolozi River, Amanzimtoti River, Umgeni River, and the largest of them is the Tugela River (www.ewisa.co.za/../defaultm.htm).

The availability of this resource across the nation faces three main challenges. The "*uneven spatial distribution and seasonality of rainfall, relatively low stream flow in rivers- which limits the proportion of stream flow that can be relied upon use; and the location of major urban and industrial developments remote from the country's larger watercourses, large scale transfers of water across catchments* (DWA 2011: 3).

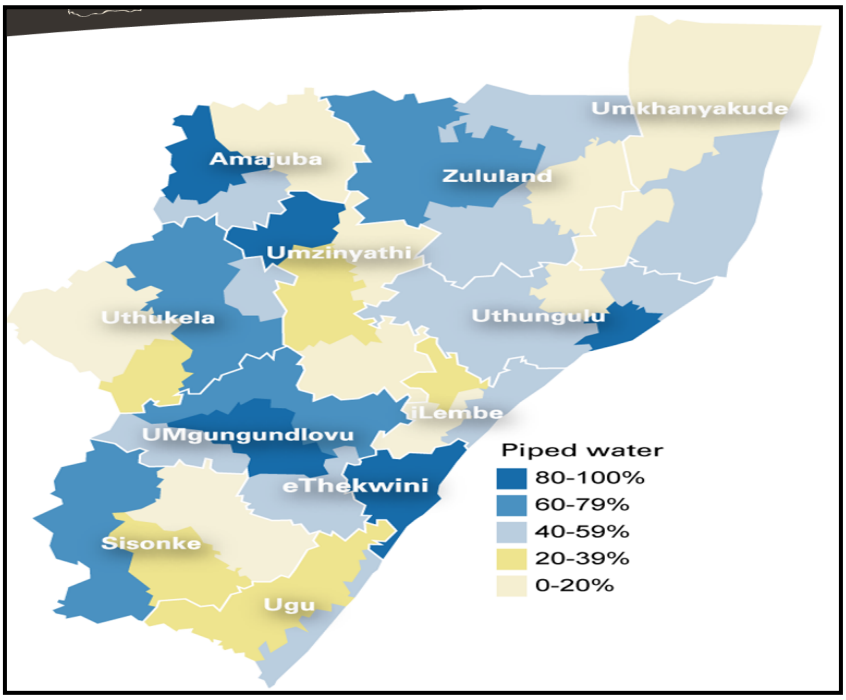
According to Muller *et al.*, (2009: 5), the limited water resource does not sustain the growing South African economy. They state further that water has been identified as a major constraint to the economic and social development of some areas in the country and will likely be a constraint to some other areas in the future. Considering this challenge, the available water has to be efficiently used to maximise the benefits of this valuable resource.

On a global scale, about half of the world population (3.5 million) will face water scarcity by 2025. On a national level, water experts have forecasted water demand exceeding the availability of economically usable fresh water by 2025. Similiar challenges occur in most of the provinces across South Africa. The present situation of water resources in the Province of KwaZulu Natal is such that the water usage *already exceeds the assured supply of water.* The sufficient rainfall pattern over the last years has given a false sense of water sufficiency, as this has kept the dams within the province full with water (Naude 2011: 2). Naude (2011: 2) further reveals the water reconciliation imbalances in the uMgeni and Mdloti River Systems (both are water treatment

utilities in Kwazulu Natal) which took place in September 2011. This indicates that the largest water treatment utility in KZN will experience deficit within a short period of time, which will be a setback to KZN. Unless the construction of new dams is completed, this will result in severe consequences for the province. The growth in the industrial and agricultural sector, as well as urbanisation of the population, further escalates the pressure on this limited resource, unless appropriate counteractive steps are taken (Muller *et al.,* 2009: 4).

While advancement has been made by DWA in reducing the water supply backlogs in South Africa from 41 percent to 5 percent in a period of 18 years, several rural communities in KZN still lack access to water for domestic and agricultural purposes (DWA 2012: 22)**.** KwaZulu-Natal is traditionally known to be the major province dealing with agricultural produce but with insufficient water supply for agricultural purposes. Water shortage has been a major constraint on development in this sector (World Wildlife Fund 2011: 5) as it is the life blood of agriculture. Furthermore, the rural areas of KZN, especially communities such as Ward 19 and a few others in the north-eastern regions, are underdeveloped in terms of water sources, purification and distribution of potable water (South Africa 2013: 11). Figure 2.4 below illustrates the household access to water in KZN.

Figure 2.4: Household access to water in KwaZulu- Natal



Source: South Africa (2013: 11)

As shown in the figure, residents of Umkhanyakude have the least access to piped water.

According to the South Africa (2013: 12), a baseline study conducted by the DWA recommended an urgent water service plan for 24 District Municipalities (DM) across South Africa. Besides Umgungundlovu and eThekwini, all other DMs were included in this list. This signifies that adequate water services provision and infrastructural development needs to be given priority in KZN by the DWA.

2.6.5 Water policy in South Africa

The water sector in South Africa has recorded a significant transition with regard to policies, goals and objectives. A comparison between the "new" National Water Act of 1998 and the

"old" 1956 Water Act distinguishes the new Act by its advancement (DWA 2011:16). The main objective of the water sector is to ensure provision of basic water services and this resonates with the constitutional demand of every South African's right of access to water. It is this constitutional necessity which has instigated the promulgation of the new water legislation (DWA 2011:17). The Water Services Act (No 108 of 1997) and the National Water Act (No 36 of 1998) provide the basis for the legislative framework within which water supply and sanitation services, water resource management and water use need to take place. In addition to these Acts, there are a number of associated pieces of legislation that contribute toward the defining of the legislative framework.

The National Water Act (No 36 of 1998) provides the framework for the way in which water resources are required to be protected, used, developed, conserved, managed and controlled.

In addition to Section 27, this Act also gets its mandate from Section 24 of the Bill of Rights of the Constitution, which states that "*everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"*. The importance of this for rural development is reiterated in this legislation. Thus, this legislation promotes the sustainability of water resource, human wellbeing and enhancement of the ecosystem.

On the other hand, the main legislation impacting on water services is the Water Services Act (No 108 of 1997) whose main objective is to assist municipalities to undertake their role as water services authorities and to satisfy the water demand of consumers (DWA 2011:18). A study

conducted by Ambujam and Anuradha (2013: 38) placed emphasis on the importance of providing rural communities with water. As many rural community members often do not have the opportunity to work in the mines or industries, they rely on agricultural activities as a survival strategy (Goldblatt 2010: 23). However, the sustainability of agriculture is heavily dependent on a steady and reliable supply of water. The unavailability of a reliable water supply has resulted in the stagnation of the agricultural sector in several rural communities (Jayne, Mather and Mghenyi 2010: 7). As mentioned by Nkondo, Zyl, Keuris and Schreiner (2012: 14), poor rural communities across South Africa do not have access to sufficient water supply for productive and agricultural purposes. They also state that these communities are the most vulnerable to natural disasters such as droughts and floods. For these reasons, they argue that when dealing with policy issues on water, those who experience water scarcity the most should be given priority.

In order to improve the standard of living amongst the disadvantaged rural communities of South Africa, the government introduced a number of initiatives. Such initiatives include free provision of electricity, sanitation, solid waste and water (Bacus 2013: 20). The South African government also enacted some policies on water provision including the Water Services Act (Act 108 of 1997) and its accompanying regulations which translated the Constitutional right of *"access to sufficient water" into firm definitions in terms of quantity, quality and assurance of supply* (Nkondo, Zyl, Keuris and Schreiner 2012: 22). Furthermore, the White Paper on National Water Policy for South Africa stipulates that "*Everyone has the right to have access to sufficient water (Bill of Rights, Constitution of South Africa, Section 27 (1)(b)).* As promulgated by this policy, "everyone" in this context implies that every South African citizen irrespective of their race, ethnicity, gender or social status has the right to sufficient water; while "access to sufficient

water" means that every South African citizen regardless of their places of residence should have access to adequate water which will suffice for their basic needs. However, such is not the case in several rural communities in South Africa (Hellum 2014: 2). Thus, this policy has not been fulfilled.

To ensure water supply to all South Africans, the DWA (2012: 49) has committed itself to ensuring "*Some, For All, Forever"*, which sums up the goals of:

- Access to a limited resource (some);
- On an equitable basis (for all);
- In a sustainable manner, now and in the future (for ever).

In an attempt to enhance the standard of living across rural communities in South Africa, the National Water Resource Strategy (NWRS) has facilitated development through "*multiple use of dams, investment in appropriate water infrastructure, water allocation reform, and a programme of support to small scale users"* (Nkondo, Zyl, Keuris and Schreiner 2012: 24-25).

The aforementioned Water Act and policies (Water Services Act Act 108 of 1997; White Paper on National Water Policy for South Africa) encompasses the entirety of the South African populace and not those residing in urban areas only. However, the implementation of these Acts are yet to become a reality in the area under study and many other rural communities, as dwellers of these communities often travel beyond 2000 metres from their residence in search of water for domestic and agricultural purposes (Mtubatuba Local Municipality IDP 2012: 41). Thus, the water expectancy is not corresponding to water reality in Ward 19.

At the time of this study, no policy on water has been implemented to uplift the current situation of the area under study. Insufficient water supply has tremendously negatively impacted on agricultural in the area under study and has also exacerbated poverty.

As evidenced by the participants of this study, the state of affairs at Ward 19 does not uphold the purpose of the National Water Act, (No. 36 of 1998) which stipulates the following as the reason for the enactment of this Act (Republic of South Africa. 2003.19):

(a) meeting the basic human needs of present and future generations;
(b) promoting equitable access to water;
(c) redressing the results of past racial and gender discrimination;
(d) promoting the efficient, sustainable and beneficial use of water in the public interest;
(e) facilitating social and economic development;
(f) providing for growing demand for water use;
(g) protecting aquatic and associated ecosystems and their biological diversity;
(h) reducing and preventing pollution and degradation of water resources;
(i) meeting international obligations;
(j) promoting dam safety; and
(k) managing floods and droughts.

2.6.5.1 Legislation impacting on water resources management

Water Services Act, 1997 (Act No. 108 of 1997)

The aim of this Act is to offer basic water supply and sanitation in accordance with the national standard and norm. It is intended that everyone in South Africa, both the urban populace as well as the rural communities will have access to water supply and sanitation. However, this Act has not been fulfilled in some rural communities in KwaZulu Natal. One such community is Ward

19. Section 156, read in conjunction with Part B of Schedule 4 of the Constitution of the Republic of South Africa (Act 108 of 1996) *vests the executive authority and responsibility to support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions in accordance to specifications decreed by the Constitution.* Though there are functioning councillors at the rural municipalities, they are not capable of providing the same services and responsibilities being provided by their urban colleagues to the people they are serving.

National Water Act, 1998 (Act No. 36 of 1998)

This Act aims to ensure that South African water resources are protected, used and managed efficiently; as well as developed and controlled in a sustainable manner for domestic and productive purposes. The Act equally identifies the government at the national level as the public trustee of South African water resources. This responsibility is assigned to the Minister of Water Affairs and Forestry, who is tasked with the primary responsibility of regulating the usage, flow and control of all available water of the nation. This same responsibility of water management is tasked to the government both at provincial as well as municipality level. In actuality, this legislation favours the urban community over the rural community. The marginalisation has led to the widening gap in the growth and development between the urban and rural areas of South Africa (DWA 2010: 8).

Water Research Act, 1971 (Act No. 34 of 1971)

This was enacted to promote research related to water affairs. To achieve this, the Water Research Commission (WRC) and Water Research Fund were established. The Minister of Water affairs and Forestry is vested with the right to appoint members of this Commission and

has the power to exercise executive oversight in connection with the Commission (DWA 2010: 8-9). However, the absence of the Water Research Commission (WRC) in rural communities is of concern, as this has an adverse effect in the present and future term planning of rural communities of South Africa. Thus, there is a dearth of information in regards to the WRC's involvement in rural municipalities.

Water Services Act (No 108 of 1997)

The main objective of the Water Services Act is to support municipalities in carrying out their responsibilities as a water service authority. The Act emphasizes on the interest of customers and gives clarification on the function of other water services. The Water Services Act (No 108 of 1997) gets its mandate from Section 27 of the Bill of Rights in the Constitution, which states that "*everyone has the right to have access to sufficient food and water, and the State must take reasonable legislative and other measures to achieve the progressive realization of these rights"*(DWA 2011:17). As highlighted by the DWA (2011:18), the main objectives of this Act are to provide for:

- Right of access to basic water supply and basic sanitation;
- Setting national standards and norms for tariffs;
- Preparation of water services development plans;
- Regulatory framework for water services institutions;
- Establishment of water boards and water services committees;
- Monitoring of water supply and sanitation services;

• Financial assistance to water services institutions;

• Accountability of water services providers;

• Intervention by the Minster or relevant province;

• A national information system; and

• Promotion of effective water resource management.

The Act further:

• establishes institutional arrangements for water services provision;

• sets out the role of water sector institutions; and

• sets out the requirements for planning and co-ordination by requiring that each water board compiles a water board business plan and that every water services authority compiles a water services development plan (DWA 2011:17-18).

2.7 The role of the Department of Water Affairs

The DWA plays a significant role in managing the country's scarce water resources. The Department is tasked with the long term sustainability of the water resource; development of the water infrastructure; improving the regulatory and institutional environment, as well as leading the transformation agenda in the water sector. The DWA's current challenges are the lack of a sectorial leadership, difficulty in ensuring equity of water availability for domestic and productive usage, restricting unlawful water use, maintenance of existing water infrastructure as well as adhering to standard water quality.

2.7.1 Challenges facing the Department of Water Affairs

Despite the water shortage, South Africa loses millions of cubic metres of water daily. Molewa (2012: 8) reported that almost 40 percent of water supplied to KwaZulu-Natal is lost. Molewa (2012: 8) further stated that, the 14 water service authorities in the KZN Province have lost more than 22 million cubic metres of water each month, of the 55.5 million cubic metres of water that was pumped monthly into KZN's supply systems. When interviewed on 17 September, 2012, Mr. Michael Singh (Water Conservation Manager, DWA) stated that the water loss was mainly due to ageing infrastructure, coupled with poor operations and maintenance. He further explained that if a good management system was in place, the DWA would not have to spend billions of rands constructing new dams, which will reduce overhead cost as well as the treatment of water cost. This will translate to more available water for domestic and productive purpose. Summing up the loss of water for the 14 authorities gives a total loss for the year of about 266.4 million cubic metres (Morgan 2012: 8).

Besides the huge volumes of water lost by the KZN Province, a second challenge worth addressing is the poor revenue collection. As explained by the DWA (2012: 63), without adequate funding for the development and management of water infrastructure and improved revenue collection from water users, achieving the national development goals will be impossible. A poor water revenue collection will invariably have a negative impact on the sustainability of some sectors which are heavily dependent on water availability. These include the agricultural, mining and manufacturing sector. Some water users are not being billed for water usage. To curb this, the DWA has set up the Water Authorization and Registration Management Systems, "WARMS". The aim of WARMS is to validate and verify water users and also to identify and register unregistered water users. The lack of appropriate skills and capacity in the right places has been identified as a critical challenge in the sector, as the DWA is short of engineers, scientists and artisans for project and programme management, as well as leadership, governance and oversight (DWA 2012: 18). The key legislative mandates of the DWA are discussed below.

2.8 Integration between rural development, water resources and agriculture

Efforts have been made by the South African government to advance the integration between land reform, agriculture, agrarian reform and water resources management (WRM)(Van Koppen, Sally, Aliber, Cousins and Tapela 2009: 4). Van Koppen *et al.*, (2009: 4) assert that developmental services such as land reform, agriculture, irrigation, domestic water supplies, WRM, financing, health, and social grants are usually planned at the national level, and implemented at the local government. These levels are often operated parallel with each other. The local government has the mandate to implement integrated development planning. However,

in this circumstance, it can only reproduce such fragmentation and poor execution (Van Koppen, Sally, Aliber, Cousins and Tapela 2009: 4).

The agricultural sector has witnessed insurmountable changes in the past decades which have been shaped by substantial macroeconomic and social reforms implemented from the mid 1990s, but reforms of agricultural policies were also initiated. Some of the policies enacted during this period were the deregulation of the marketing of agriculture products; abolishing certain tax concessions favouring the sector; reduction in budgetary expenditure on the sector; land reform; and trade policy reform (Organisation for Economic Co-operation and Development 2006: 2). Conversely, none of these reforms have impacted directly on Ward 19. On the contrary, the Communal Land Rights Act (2002) which was structured to provide for legally secure tenure in communal areas and accord comparable redress where necessary, has benefitted the farming community of Ward 19. This reform resulted in the redistribution of expanses of land which were previously owned by white commercial farmers to the farmers of Ward 19. Thus, this reformatory action is advantageous to agriculture in the area of study (Kariuki 2009: 8).

There exists a direct linkage between rural development, water resources and agriculture (Averbeke 2008: 22-23). Agriculture aptly thrives in regions with sufficient amounts of water, and thus in rural communities characterised by agriculture. Agriculture plays an expedient role in underpinning rural development in such communities, such as the Ward 19 area in Mtubatuba Municipality (Muller, Schreiner, Smit, Koppen, Sally, Aliber, Cousins, Tapela, Merwe-Botha, Karar and Pietersen 2009: 19-21). Hence, this study will use a model to show the relationship between agriculture, water resources and rural development.

Integrated water resource management models usually are, simulated diagrams or figures made up of different elements that are interconnected. Often, the model is driven by stochastic dependent and independent variables such as precipitation, demand, events, etc (www.goldsim.com/web/solutions/environmentalsystems/waterreources). In this study, two models will be used by the researcher to represent the desired state of water resource management in the Ward 19 area of Mtubatuba Municipality. The desired state of water resource management is explained with the following models:

1. Model 1 - Integrated water resource management
2. Model 2 - Integrated water resource management

Integrated water resources management (IWRM) is rated as the leading conceptual framework for managing water resources globally. IWRM policies are aimed at ensuring sustainable supplies of freshwater for (http://www2.fiu.edu/~glows):

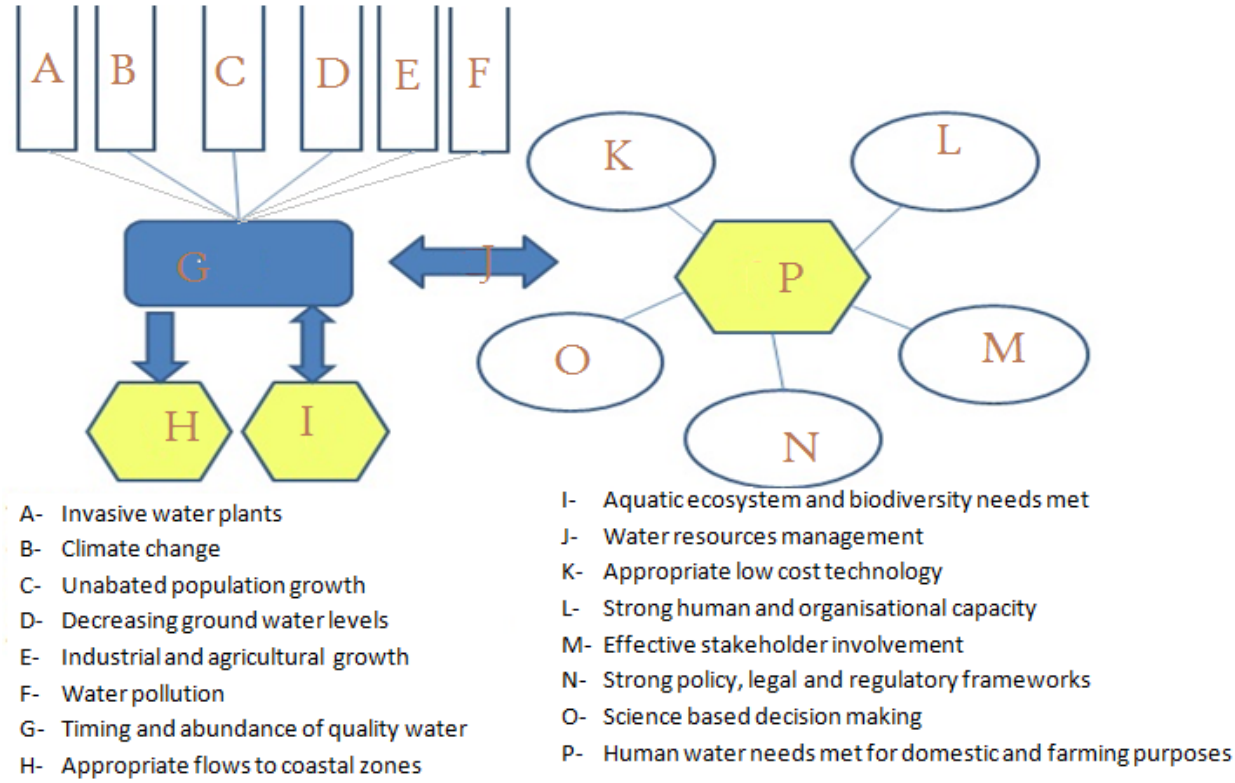
- The multiple sectors of human use and development,
- In-stream needs for ecosystem processes and biodiversity conservation, and
- The needs of upstream and downstream human communities and ecosystems, including coastal zones.

As illustrated in Figure 2.1, variables A to F (Invasive alien plants, climate change, unabated population growth, decreasing ground water levels, industrial and agricultural growth and water pollution) are the main factors depleting the water resource in South Africa, while variables K, L, M, N and O (appropriate low cost technology, strong human and organisational capacity, effective stakeholder involvement, strong policy, legal and regulatory frameworks, science-based decision making) are strategies which could be used to address the challenges cited between

variables A to F (factors depleting the water resource). For instance, legal and regulatory frameworks, as well as science based decisions can be used to reduce the impact of climatic change on agriculture (Van Koppen *et al.,* 2009: 24-27). Furthermore, a successful implementation of K, L, M, N and O can possibly result in G, H, I and P (to timing and abundance of quality water, appropriate flows to coastal zones, aquatic ecosystem and biodiversity requirements and, most importantly, the requirements for domestic and productive (farming) needs are met). According to Goldin (2008: 209-210), strong policy formulation and implementation can enhance the availability of a water supply and improvement of the aquatic ecosystem. According to Goldin (2008: 209-210), strong policy formulation and implementation can enhance the availability of water supply and improvement of the aquatic ecosystem. Goldin (2008: 210) further mentions that lack of expertise had been a hindrance towards the formulation and implementation of water policies. In recognition of this skill shortage in the water sector, Goldin (2008: 210) recommends the training of personnel and that more investment and progressive policies should be implemented using different approaches by the government in order to enact strong and effective policy formulation and implementation (of these policies) by the water sector. Also, water shortage being a prevalent issue in Ward 19 can be addressed through a combination of strong human and organisational capacity, effective stakeholder involvement and through the usage of appropriate low cost technology (Stockholm International Water Institute (SIWI) 2008: 3-7; United Nations Environmental Programme (UNEP) 2011: 2-5). Effective stakeholder involvement will imply a purposeful co-ordination and exchange of ideas, skills and experiences amongst policy makers in Mtubatuba Municipality; farmers of Ward 19; staff members of the Department of Water and Sanitation (Mtubatuba Municipality), as well as the personnel of the Department of Agriculture (Mtubatuba). Such purposeful co-

ordination should have an agenda of strategising on how to make optimal use of water resource for productive and domestic purposes, while also planning for future water usage. This thus explains an effective water resource management approach.

Figure 2.5: Model 1 (Integrated water resource management)



Source: Adapted from: http://www2.fiu.edu/~glows (2011)

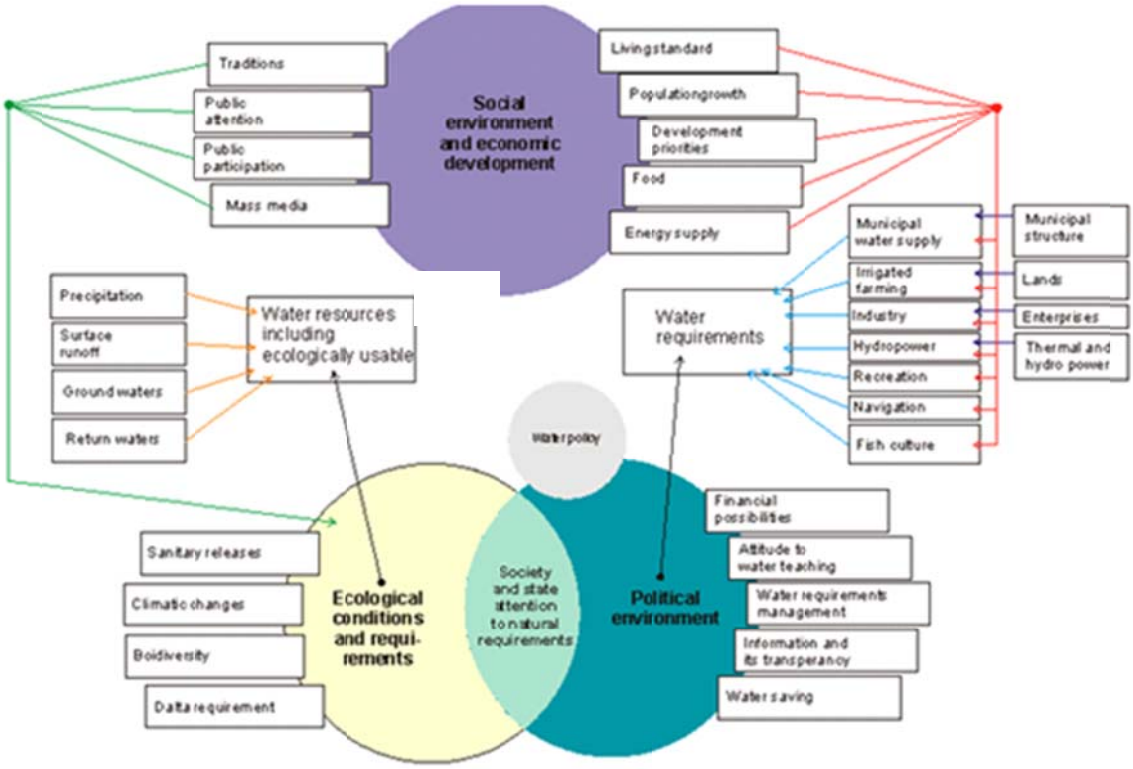
The above model has been used in this study as the variables found in it (A-P) are applicable to the area under study. For instance, invasive water plants "A" have been a challenge to the farming community in Ward 19. Also, variables such as "M", *effective stakeholder involvement* and "N", *strong policy, legal and regulatory framework* are roles expected of stakeholders and government officials respectively. Successful *water resource management,* "J", will result in "P", whereby the human water requirements for domestic and agricultural purposes in the area

under study are met. It is highly imperative that the need for water for domestic and farming purposes be met in Ward 19 as this has been a major contributing factor to underdevelopment and poor living conditions. Furthermore, water shortage has resulted in slow growth and development in the subsistence farming of this community (Limouzin and Maidment 2009: 20).

Figure 2.6 provides an all-encompassing approach to an integrated water resource management system whereby every aspect of water is engaged. It involves the government, consumers, as well as nature. Fulfilling an integrated water resource management approach will imply a water development strategy which will suffice the requirements of the consumers and provide sufficient water for productive uses while meeting the requirements of the ecosystem.

The illustration identifies 3 different role players: the social and economic development at one end and political environment at the other end, while the ecology is termed as the third. The social and economic development highlights public participation and water uses for domestic and production purposes. It further incorporates the municipal structure. The political dimension in this illustration is equally important as it deals with awareness and management of the limited resource. Lastly, it identifies the ecological part, which is divided into water resources and ecological usability. Sound knowledge and efficient management of each of the role players will result in effective water resource management, which translates into growth and development, thereby reducing poverty.

Figure 2.6: Model 2 (Integrated water resource management)



Source: http://google.co.za/search?q=models+on+integrated+water+resource+management(2011)

Figure 2.6 incorporates the dependent and independent variables in a manner that will enable policy makers to stimulate and forecast the outcome of alternative policies on water management. At a glance, the model provides a cross-sectoral policy approach aimed at modifying the traditional approach which has resulted in unsustainable water usage. However, in the current study, the researcher examined water resource management as a mechanism for sustaining and developing subsistence farming in rural communities. The dependent variables in the model are the social, economic and political environments, while the independent variable is the ecological condition. The ecological condition refers to the structure and operation of aquatic

ecosystems and is mainly evaluated on the basis of the environmental elements, resources and organisms co-habiting in water. The ecological condition of water resources can either underpin or undermine agriculture and fishery (National Research Institute of Science and Technology for Environment and Agriculture 2012: 1). In addition, the water requirement directly concerns the policy makers. All the elements identified in Figures 2.1 and 2.2 will have to be involved in achieving an integrated water resource management response in the area under study. However, the municipality has to take the leading role in achieving integrated water resource management by creating awareness and educating their community members.

Furthermore, the illustrations in Figure 2.1 and Figure 2.2 are relevant to the subsistence farming community in Ward 19 as this community requires a tailored approach to revamping the subsistence farming. More particularly, the available water resource needs to be judiciously utilised with the aim of making every drop of water adequately used in the most productive manner. A good understanding of these models and implementation by policy makers in the area under study can fast track development in subsistence farming, thereby improving livelihood. However, the policy makers (Councillors, Mayor, Department of Agriculture and Department of Rural development), while implementing these decisions, will also need to involve the farmers in this community to ensure sustainability and a good understanding of such decisions.

2.9 Conclusion

The literature review in this study discussed the pathways for sustainable subsistence farming and poverty eradication through the implementation of an efficient water resource management practice. The chapter also evaluated the strategies put in place by the DRDLR in fighting poverty and underdevelopment in rural KZN. As highlighted in the study, development is a gradual

process, and water resource management can possibly be the first step in elevating poverty amongst subsistence farmers in water scarce rural areas of South Africa.

Revamping subsistence farming as well as improving the standard of living amongst rural subsistence farmers requires a purposeful co-ordination and exchange of ideas between researchers in the field of study, policy makers, as well as stakeholders. Such purposeful co-ordination should have an agenda of transforming subsistence farming to a sustainable form of farming, whereby many of the rural populace will be encouraged to partake as a means of livelihood. The resultant effect of this will be an increase in household income as well as food security, thereby reducing poverty.

Chapter 3 provides an overview of water resource management in the area of study.

Chapter 3: Water resource management in Ward 19

3.1 Introduction

The preceding chapter provided literature on subsistence farming, water resource management and rural development within the South African context. This chapter provides the background into area the under study. It will critically analyse the role of water in subsistence farming, as well as the impact of this resource on rural development in the Ward 19 area of Mtubatuba Municipality. In addition, to give credibility to the research, other subsistence farming communities within the Mtubatuba Municipality which have similar characteristics with Ward 19 will be discussed. Furthermore, the contrast and comparison between these communities will be highlighted. A description of the current status of natural resources such as water resources, soil type and climate, and how these resources impact on subsistence farming and rural development within the research focus area is also provided.

3.2 Rationale for the area of study

At the inception of this study, the researcher met with experts from the Department of Water Affairs (DWA) at the Durban office and enquiries were made on water scarce areas in KwaZulu-Natal. Umkhanyakude, which is situated in the North-eastern corner, was identified as one of the worst water-scarce areas within the province. Subsequent to a series of emails and telephone calls, appointments were made with municipal officials in Umkhanyakude. Upon meeting the municipal officials, enquiries were made on where most of the farming communities were situated. However, because the municipal officials were unable to give a precise location of farm settlements, the researcher was referred to the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba Municipality (one of the municipalities in Umkhanyakude). After a brief discussion with Mr. Velaphi Myeza (Extension Officer to the

Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba Municipality), six farming communities were visited within Umkanyakude. The researcher then chose to research water resource management in the Ward 19 area of Mtubatuba Municipality as the adequate utilisation of water is imperative in this community. Furthermore, the study is based in KZN as the researcher resides within this province. The selection of Ward 19 was based upon the following criteria:

1. Ward 19's major source of livelihood is subsistence farming. Evidence provided by Mr Myeza revealed that an estimated 60% of the populace found in this community are involved in subsistence farming as a means of livelihood;
2. Water-scarce region - the farm land in Ward 19, as well as surrounding farming communities, often records low rainfall during the winter period (April - August), which has a negative effect on crop yield (MacVicar *et al*., 2013: 1); and
3. There is a high incidence of poverty – Ward 19 falls under one of the most poverty-stricken homelands of the apartheid era, which has a significant backlog of infrastructure and limited job opportunity (Bacus 2013: 31).

3.3 Subsistence farming in Ward 19 (Mtubatuba)

The importance of subsistence farming cannot be overemphasised in Ward 19 as it is the main source of livelihood for this community. Surrounding communities are also involved in this mode of farming. Evidence given by Mr Myeza (Coordinator to Hlaleneni Landscape project) reveals that above 50 percent of the rural community in Mtubatuba Municipality are involved in subsistence farming. This literally means that the development of subsistence farming in this region will translate into a better standard of living, thereby reducing poverty. Due to the

significance of this mode of farming, the government at the provincial as well as district level has been able to offer some support to enhance the growth of subsistence farming.

The KZN provincial government established the Department of Agriculture, Environmental Affairs and Rural Development in each of the Municipalities in order to provide strategies for revamping decaying subsistence farming. Each of these departments studied the nature of challenges relating to subsistence farming in their respective municipalities; identified the potentials, and thereafter devised action plans and implemented the action plans. At Mtubatuba Municipality, in sustaining subsistence farming, the Department of Agriculture, Environmental Affairs and Rural Development has been able offer their expertise, such as educating the farmers on what crops to plant at particularly periods of the year. It provided tractors which were used in clearing the farmlands, as well as uprooting invasive alien plants. The department also provided "vegetable tunnels" (vegetable tunnels are rectangular in shape, with a height of about one metre, having a breadth and length of 1-2 meters. They have shade-nets to reduce the intensity of sunlight and growth media are placed inside plastics where the crops are being planted to provide the crop some moisture and to minimise the intensity of sunlight on some specific vegetables. In addition, the farm lands are often fenced to create a barrier from grazing animals which are liable to destroying crops. Insecticides and fertilisers are provided when the need for them arises. Furthermore, stipends are provided to subsistence farmers, while workshops are organised on a yearly basis to upgrade their farming skills.

3.4 The water situation in Ward 19

The main challenge constraining development in Mtubatuba Municipality is the lack of adequate water for domestic, agricultural and industrial purposes. The populace of this municipality has *no access to potable water in accordance with the standards set by the National Department of*

Water Affairs. The nature of the backlog includes the lack of extensive use of boreholes and natural sources of water (Mtubatuba Municipality Integrated Development Plan 2013: 42).When interviewed on the 17th of December 2013, Gumede (Technical Supervisor, Water and Sanitation, Mtubatuba) asserts that the only water source to Ward 19 is rainfall. He mentions that the ward has no flowing rivers or boreholes. Gumede further claims that the water availability in this community is more than twice its demand.

The Hlaneni Landscape project initiator, Mrs. Magwaza, also mentions that Ward 19 lacks water infrastructure and the available water resources are been managed through traditional means such as storage in clay pots and digging of small dams at suitable locations within the farm land.

Mrs Magwaza also states that the limited available water is judiciously used for domestic purposes and rearing livestock, while the bulk of this resource is used for crop production. However, the available water received through rainfall is often insufficient to sustain their crops, which hinders the growth of subsistence farming. At the time of this study, the community had no water treatment plant. However, the Mtubatuba Municipality has a future plan to put this in place (Mtubatuba Municipality Integrated Development Plan 2013: 97).

The main challenges related to water supply in this community include low amounts of rainfall and steep topography whereby only little amounts of rainfall is retained after each downpour. The, provision of water infrastructure will be highly costly as households are often scattered across the ward (Mtubatuba Municipality Integrated Development Plan 2013: 85).

3.5 Roles and responsibilities of Mtubatuba Municipality Council

The Local Government: Municipal Structures Act 117 of 1998 *"provides for the establishment of municipalities in accordance with the requirements relating to categories and types of*

municipality; to establish criteria for determining the category of municipality to be established in an area; to define the types of municipality that may be established within each category; to provide for an appropriate division of functions and powers between categories of municipality; to regulate the internal systems, structures and office-bearers of municipalities; to provide for appropriate electoral systems; and to provide for matters in connection therewith". The Constitution of the Republic of South Africa establishes the local government as a distinct sphere of government, interdependent and interrelated with national and provincial spheres of Government (http://www.polity.org.za/article/local-governmentmunicipal-structures-act-no-117-of-1998-1998-01-01)**.** Furthermore, the Constitution stipulates that municipalities are required to fulfil their constitutional obligations to ensure sustainable, effective and efficient municipal services; promote social and economic development; and encourage a safe and healthy environment by working with communities in creating environments and human settlements in which all our people can lead uplifted and dignified lives (www.justice.gov.za /.../Local_Government__Municipal_Structures_Act1). The municipality objectives are as follows (www.justice.gov.za/.../Local_Government__Municipal_Structures_Act1):

- Strive within its capacity to achieve the objectives set out in section 152 of the Constitution;
- Annually review-

(a) the needs of the community;

(b) its priorities to meet those needs;

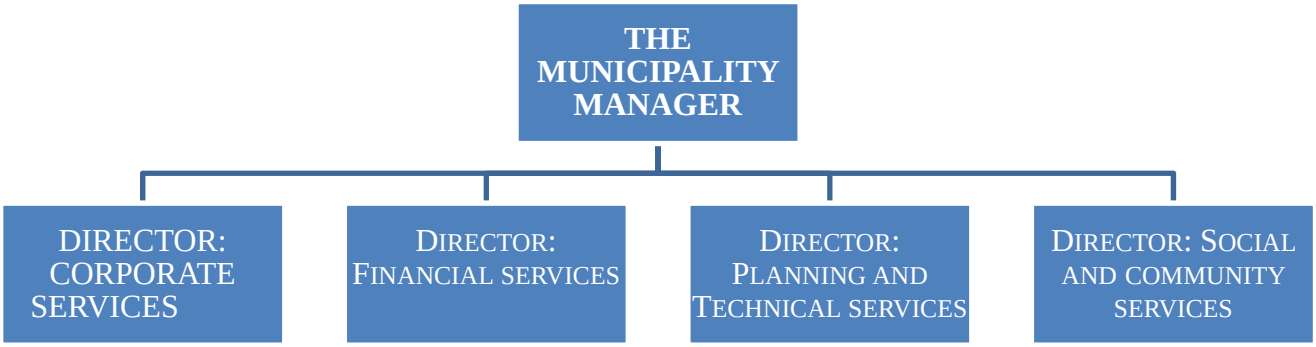
(c) its processes for involving the community;

(d) its organisational and delivery mechanisms for meeting the needs of the community; and

(e) its overall performance in achieving the objectives referred to in subsection (1); and

- Develop mechanisms to consult the community and community organisations in performing its functions and exercising its powers (http://www.francesbaard.gov.za/documents/2011/related%20legislation/Municipal-Structures-Act.pdf).

Figure 3.1: Organogram of Mtubatuba Municipality



Source: Mtubatuba IDP (2012: 54)

Figure 3.1 illustrates the roles and responsibilities of the various units in the municipality. The various units deliberate thoroughly on issues before the submission of policies to the Council for adoption and implementation. Through such designated committees, councillors of each ward are empowered to direct the political affairs of their ward. The management structure in this municipality consists of four departmental units which are under the supervision of the Municipal Manager. The Municipal Manager's office is tasked with accountability and also

responsibility for the financial administration of the municipality. The departments managed by the Municipal Manager are:

- Corporate Services Department;
- Financial Services Department;
- Planning and Technical Services Department; and
- Social and Community Services Department (Mtubatuba IDP 2012: 54).

3.5.1 Role of the municipality in rural development

The role of the municipality is stated in Section 152 (1) of the Constitution of the Republic of South Africa. It highlights the objectives of local governments as (Mtubatuba IDP 2012: 13):

a) to provide democratic and accountable government for local communities;

b) to ensure the provision of services to communities in a sustainable manner;

c) to promote social and economic development;

d) to promote a safe and healthy environment; and

e) to encourage the involvement of communities and community organisations in the matters of local government.

In addition, Section 152 (2) of the Constitution of the Republic of South Africa stipulates that the "*municipality must strive, within its financial and administrative capacity, to achieve the objectives set out in subsection (1)*".

Furthermore, Section 153 asserts that in order to fulfil developmental duties, a municipality is required to (Mtubatuba IDP 2012: 13):

a) structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community; and

b) participate in national and provincial development programmes.

However, Mtubatuba Municipality is confronted with some challenges which have made it quite challenging for the above duties to be fulfilled, such as the inability to provide quality services to communities in a sustainable manner.

3.5.2 Challenges faced by the municipality

The Mtubatuba Municipality Integrated Development Plan (2013: 66) identified the challenges faced by this municipality. The major challenge is the poor communication between the municipality and the community members. For instance, there have been instances where the municipality claimed it will cut off the water supply during specific hours. However, the community members alleged not to be informed about such water cut offs. The Mtubatuba Municipality IDP (2012: 14) further acknowledges water scarcity as a major challenge as it has constrained the growth in every sector within the municipality.

In addition, the Mtubatuba Municipality IDP (2012: 14) also points out the following as main challenges. These include;

- Drought;
- Poverty and unemployment;
- High prevalence of TB, HIV and AIDS;
- Illegal dumping;
- Universal access to basic services and maintenance of infrastructure; and
- Intergovernmental co-ordination across spheres of government.

Other challenges faced by this community include a lack of electricity, poor housing and sanitation (Mtubatuba Municipality IDP 2012: 14).

All of the aforementioned challenges directly or indirectly impede the development of subsistence farming and rural development. For instance, the high prevalence of HIV and AIDS has resulted in a decline of the labour force (Mtubatuba IDP 2012: 53-54). This further translates to government expending more finances on social grants (Ngomane 2012: 10)**.**

3.6 Sources, demand and supply of water in Mtubatuba Municipality

Evidence provided by Mr. Joseph Gumede, the Technical Supervisor of the Water and Sanitation department in Mtubatuba Municipality on the 24th of February 2014 revealed that the main water sources to the municipality are rainfall and Mfolozi River. He explained that the Mfolozi River serves the two reservoirs in Mtubatuba, namely, the Boboza Reservoir and Monzi Reservoir. The Boboza Reservoir is situated along the N2 route in Ward 6 of Mtubatuba Municipality and serves the following communities within the municipality:

1. St. Lucia
2. Kwasame
3. Monzi
4. Khula Village
5. Indlova village
6. Mtubatuba and Nordale.

The second reservoir, the Monzi Reservoir serves parts of rural communities in Ward 2, selected sections in Nordale, as well as Kwasame. When the Boboza Reservoir operates at its peak, it is able to supply 12 million megalitres per day, while the Monzi Reservoir is capable of supplying

3 million mega litres daily. The combination of these reservoirs generates a sum total of 15 million mega litres daily to the Mtubatuba Municipality.

Mr. Gumede further stated that the 15 million megalitres pumped on a daily basis is not sufficient to satisfy the needs of the high water demand in the municipality. He estimated the municipality daily water requirement at 20 million megalitres. Mr. Gumede concluded by highlighting the main challenges facing the Water and Sanitation department of the Mtubatuba Municipality as follows:

- Drying up of water sources during winter;
- Population increasing at a geometric progression as compared to water supply;
- Infrastructural challenges such as power failure and leakage of old pipes;
- Unskilled and shortage of staff members;
- Poor planning at the initial stage of laying water pipes;
- Poor coordination between the municipal management team and water and sanitation unit; and
- The low standard of pipes used at present. (Class 9 pipes are being used at present, whereas the required suitable class is either Class 12 or Class 19).

Another point worth mentioning is that the municipality does not provide water for the agricultural sector which provides employment for 15 % of the municipal populace. The farmers rely on rainfall to sustain their crops. Although only 15 % of the entire Mtubatuba Municipality are engaged in agriculture, some wards such as Ward 19 have above 50 % of the populace engaged in farming. This serves as a means of livelihood in such communities.

3.6.1 Rainfall pattern in Mtubatuba Municipality

This section provides a table which illustrates the rainfall pattern in Mtubatuba. It also analyses the impact of rainfall on subsistence farming in the area under study.

Table 3.1: Rainfall

Rainfall	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Median rainfall(mm)	653	91	91	76	40	28	13	9	17	33	73	85	97
Mean rainfall (mm)	742	89	106	97	59	37	34	26	26	45	63	77	83

Source: Adapted from MacVicar *et al*., (2013: 1)

As observed from Table 3.1, the annual median and mean rainfall in Mtubatuba Municipality is 653mm and 742mm respectively. The figure further reveals rainfall at its peak during the months of January (91mm), February (91mm), November (85mm) and December (97mm). On the other hand, low rainfalls are recorded during the months of April (40mm), May (28mm), June (13), July (9mm), August (17mm) and September (33mm). Due to the low rainfall experienced between April and September, subsistence farmers in the area under study find it challenging to sustain their crop production. Evidence given by one of the participants of the study reveals that of the four crops she produces (tomato, potato, maize and beans), only the dry beans barely survives during these months. Henderson and Dimsey (2014: 4) confirmed that crops such as tomato, potatoes and maize need a minimum of 90 mm of rainfall to have a good yield. Allemann and Young (2011: 37) concur with Henderson and Dimsey (2014: 4) when they posit that vegetables require a minimum of 85mm of rainfall over a period of three months to have a good yield.

3.7 Current status of natural resources and their impact on subsistence farming

This section discusses the current status of some of the natural resources in the area under study and how each of these resources impacts on subsistence farming. The soil type, water resources, vegetation type and topography are highlighted.

7. Soil type

Table 3.2: Soil types

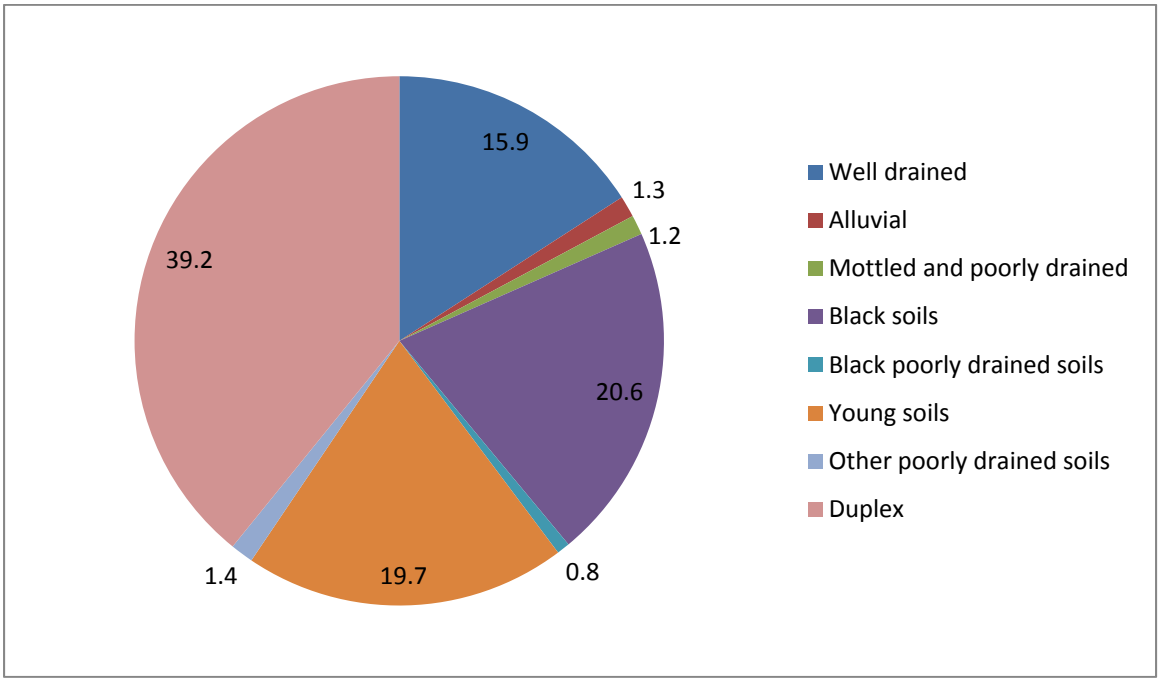
Soil type	Percentage of soil	Area (ha)
B- well drained	15.9	3607
C- Alluvial	1.3	283
E- Mottled and poorly drained	1.2	263
F- Black soils	20.6	4664
G- Black poorly drained soils	0.8	188
H- Young soils	19.7	4462
I – Other poorly drained soils	1.4	308
J- Duplex	39.2	8878

Source: Adapted from MacVicar *et al*., (2013: 3)

As shown in Table 3.2, the alluvial soil type, which is one of the most suitable soil types for crop production, accounts for 1.3 % of the total soil type in the municipal. The alluvial soil type is found on only 283 hectares of the total municipal land area of 22, 653 hectares. Mr Myeza (Extension Officer to the Department of Agriculture, Environmental Affairs and Rural Development) stated that the “alluvial soil” is found only in some areas in Ward 19 as the dominant soil type is the “Black poorly drained soil”. He further explained that the “Black poorly drained soil” does not support good crop yield. This soil type has an adverse effect on crop production and is therefore a constraint to the growth of subsistence farming. Mr Myeza also mentions that, though some of the soil types found in Ward 19 are not suitable for crop

production, the location chosen for the "Hlaneni Landscape project" in Gunjaneni (situated in Ward 19) has one of the most fertile soil types in Ward 19.

Figure 3.2: Soil types



8. Water resources (rivers)

There are a total of four rivers within the municipality. Three of these rivers are perennial, while the forth is a non-perennial river. However, none of these rivers are situated around Ward 19 (MacVicar, Loxton, Lambrechts, Roux, Villiers, Verster, Merryweather, Rooyen and Harmse 2013: 3). Close proximity of a river would be advantageous to farmers in the area under study, as they will be able to draw water to sustain their crops during the drought period.

9. Vegetation type

There are four distinctive vegetation types in Mtubatuba Municipality, namely:

1. Bioresource Group: *Ua7 is found in Bioresource Group 22, (BRG subgroup 22.2a).* The Bioresource Group 22 is often termed as the "Lowveld";

2. Vegetation pattern: This comprises the bushed grassland and bushland;

3. Indicator Species: This consists of the Black Monkey Thorn, Weeping Boer-Boon and the Marula; and

4. Predominant vegetation types consist of the Zululand Lowveld (Ua7a) and Zululand Lowveld (Ua7b).

Mr. Myeza asserted that the dominant vegetation types in Ward 19 are the bushed grassland and bushland. These vegetation types are often not classified as suitable farming vegetations (http://www.jipb.net/pubsoft/content/2/3507/x02130.pdf).

4. Topography

A significant portion of the land area in Umkanyakude District is described as moderately sloped. More particularly, locations situated on the north-eastern and north-western axes where Mtubatuba is located are predominantly sloped. Moderate slopes range between 5 to 12 %, while land areas considered as "secondary steep" are greater than 12 % (MacVicar *et al*., (2013: 3). A steep terrain has a negative impact on subsistence farming as the soil will only be able to absorb little amounts of rain water after each rain fall (Eldridge 2007: 1).

3.8 Dominant soil ecotopes and their effect on subsistence farming

Table 3.3: Dominant soil ecotopes

Ecotope	Area(ha)	% of BRU	Clay content %	Depth range (mm)	Slope range %	Fb rating	Terrain units	Soil series
J.1.4.b.0	685.5	2.8	>=36	300-500	4-12	3.9	3,4,1/5	Ss27, Sw11, Sw31, Sw32, Sw41
J.1.4.b.0	671.5	2.8	>=36	100-300	4-12	3.9	3,4,1/5	Ss27,Sw31, Sw41
J.2.3.b.0	1522.6	6.2	15-35	301-500	4-12	2.8	3,4/5,1	Es36, Ss26,Sw30,Sw40,Va30, Va31,Va40,Va41
J.2.4.b.0	1470.8	6.0	15-35	100-300	4-12	2.7	3,1/4,5	Es36, Ss26,Sw30, Sw40, Va30,Va31,Va40,Va41
J.3.3.b.0	541.8	2.2	<14	301-500	4-12	1.0	3,1/4,5	Es22, Es33, Es34, Es41, Es42, Ss24, Va30, Va31
J.3.4.b.0	537.9	2.2	<14	100-300	4-12	1.0	3,1/4,5	Es22, Es33, Es34, Es41, Es42, Ss24, Va30, Va31

Source: Adapted from MacVicar *et al*., (2013: 2)

When interviewed on 4th of February 2014, Mr. Mchunu Thobelani (Soil Scientist to Mtubatuba Municipality) explained the ecotopes, clay content, slope range, terrain units and soil series illustrated in Table 3.3. He acknowledged that the ecotopes, clay content, terrain and soil series have degraded over the years partly due to invasive alien parts, low rainfall during the winter season, animal grazing and other climatic factors. He mentioned further that the existing soil ecotopes predominant in Mtubatuba Municipality do not rank amongst the most suitable soil types for farming purposes.

3.9 Background to Ward 19 in Mtubatuba Municipality

The Mtubatuba Municipality is located on the shoreline of north-eastern KwaZulu-Natal. This municipality is one of the five local municipalities within the Umkhanyakude District. Subsequent to the May 2011 local government elections, the Mtubatuba Municipality consisted

of 19 wards which encompasses an estimated 1 970 square kilometres (Mtubatuba IDP 2012: 26).

The area under study "Ward 19" is situated in Mtubatuba Municipality. Over the years, a high incidence of poverty has been recorded in this ward as the majority of the residents live below the poverty line. This community is characterised with poor infrastructure and the residents' main source of livelihood is subsistence farming (Mtubatuba IDP 2013: 40). When interviewed on the 9th January 2013, Mr. C.V Mkhwanazi (Councillor to Ward 19) asserted that Ward 19 is the largest ward in South Africa and also amongst the poorest.

Table 3.4: Population and households

Municipality	Population (2001)	Household (2001)	Population (2011)	Household (2011)
Mtubatuba	33 612	7 472	143 908	24 440

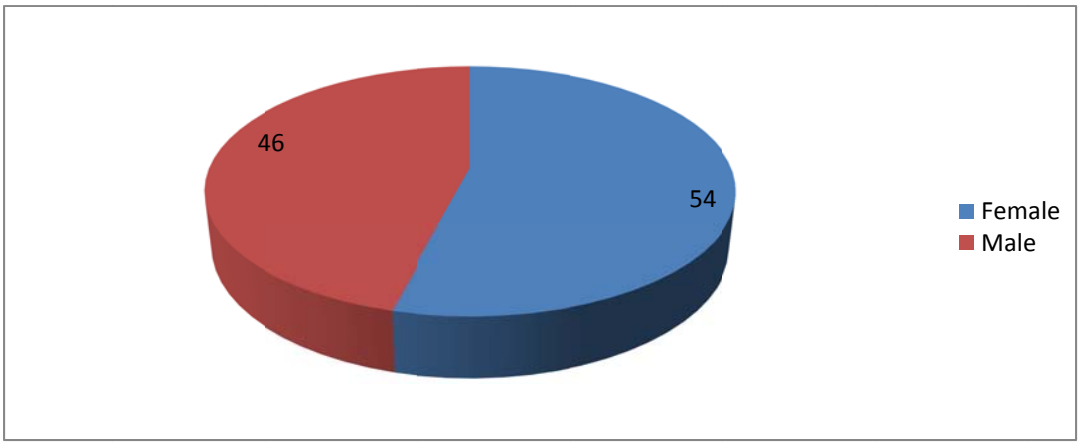
Source: Adapted from Mtubatuba Local Municipality IDP (2012: 37)

Table 3.4 provides the number of households and population increment between 2001 and 2011. It can be deduced that, between these years, the population grew by 328.1%, while the numbers of households also grew by 227.1%. The increment in population has a direct implication for water, livelihood and poverty. More dwellers in this community will be compelled to survive with the insufficient water resource, which does not only restrain development but can also have an adverse effect on the wellbeing of the people residing in this community.

3.9.1 Gender distribution

As illustrated in Figure 3.3, the male residents of Mtubatuba Municipality comprise 46% of the population, while the female residents comprise 54%. This distribution is partly due to the high percentage of the male populace having migrated to urban centres in search of a better livelihood through employment. The gender distribution between the male and female populace is, however, more obvious in Ward 19. Chief Mdletshe, the Induna (traditional leader) of Gunjaneni (Gunjaneni is a community within Ward 19) gave an estimate of 40 percent male and 60 percent female gender distribution in this Ward. The predominant gender engaged in subsistence farming in rural communities of South Africa is often the women folk (Govender 2013: 2). Hart and Aliber (2012: 6) assert that men outnumber women in commercial farming. However, in subsistence farming, women surpass men. This population disparity between the male and female gender in the area under study show cases why women should be empowered, as the source of livelihood is mainly dependent upon them. This view is amplified by Xingwana (2012: 2) who argues that women in rural communities should be empowered as a means of accelerating rural development in South Africa.

Figure 3.3: Gender distribution

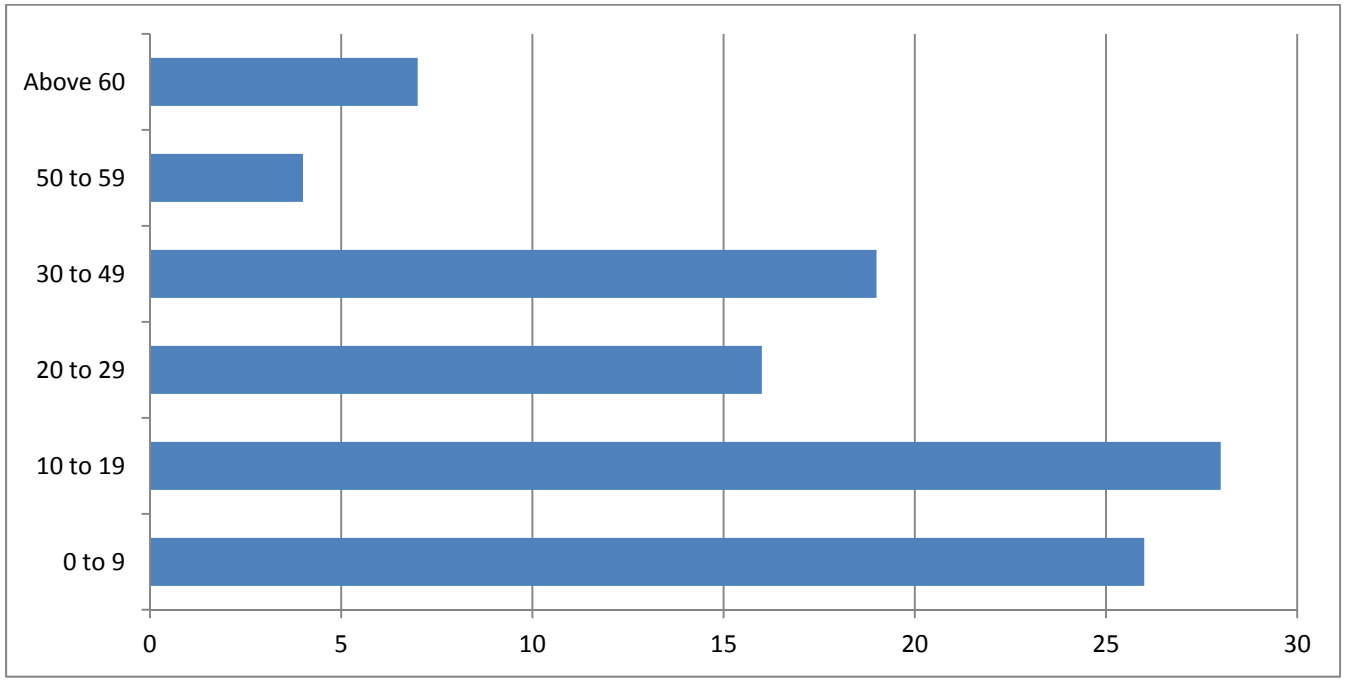


Source: Adapted from Mtubatuba Local Municipality IDP (2012: 38)

3.9.2 Age distribution

Figure 3.4 illustrates the age profile, which is predominately a youth populace of about 70 percent. This implies that 70 percent of this community are below the age of 30**.** Furthermore, it is indicative that the populace between the age bracket of 30 and 50 years only contribute to 23% of the entire population. This suggests a low economically active population which could have an adverse effect on the development and growth of the locality.

Figure 3.4: Age distribution



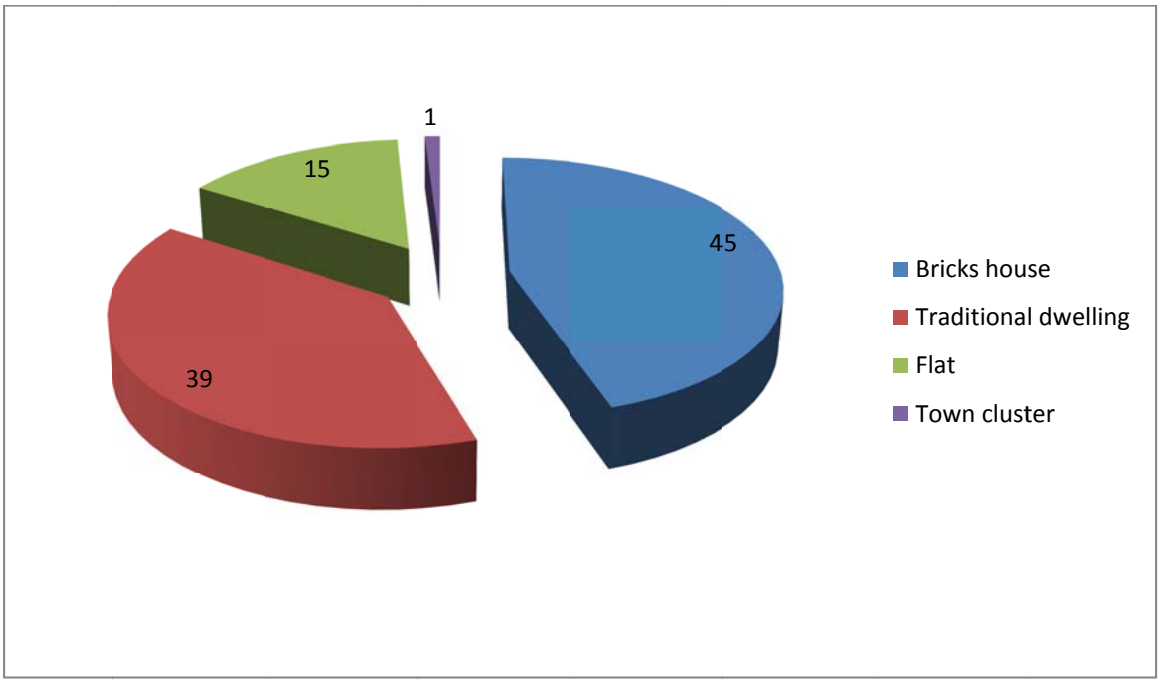
Source: Adapted from Mtubatuba Local Municipality IDP (2012: 39)

3.9.3 Dwelling type

Figure 3.5 shows that 39% of the Mtubatuba Municipality is yet to benefit from the governments human settlement programme launched in 1994 (Mtubatuba IDP 2012: 42). As observed by the researcher, the prominent dwelling type in the Ward 19 area is the traditional type. Furthermore,

these houses lack electricity, reticulated water and sanitation. This reveals that the area under study is in need of further infrastructural development to enhance the community's standard of living.

Figure 3.5: Dwelling type

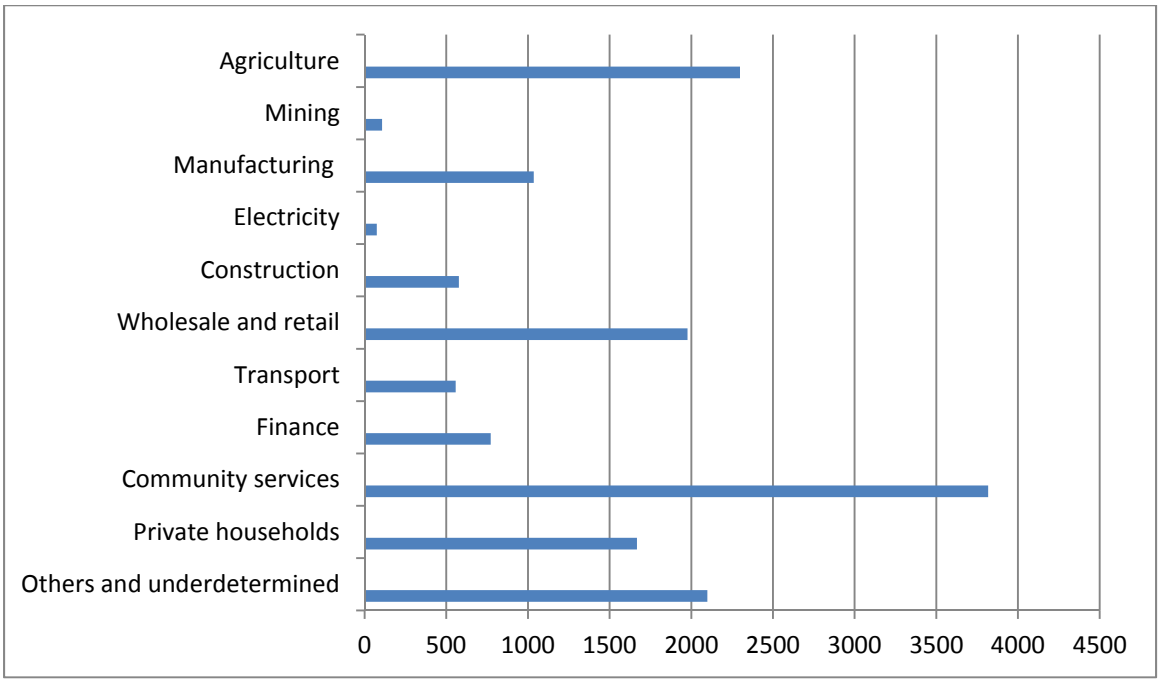


Source: Adapted from Mtubatuba Local Municipality IDP (2012: 42)

3.9.4 Economic sector

As illustrated in Figure 3.6, a significant percentage of the residents of the Mtubatuba Municipality are involved in community services (26%), followed by the agricultural sector (15%). Considering the percentage of individuals involved in farming, the development of this sector can have a significant impact on the standard of living in this municipality.

Figure 3.6: Economic sector



Source: Adapted from Mtubatuba Local Municipality IDP (2012: 40)

3.9.5 Access to water

One of the dominant challenges in Mtubatuba Municipality is the lack of sufficient water for domestic, agricultural and industrial usage. At time of this study, the entire "*Mtubatuba Municipality population had no access to hygienic water in accordance with the standards set by the National Department of Water Affairs. The nature of the backlog includes the lack of extensive use of boreholes and natural sources of water.* However, none of this water supply is purified. *Only 4686 households benefit from a regional water scheme ranging from boreholes to inside yard water provision"* (Mtubatuba IDP 2012: 41). In accordance with the standard specified by the DWA, every South African is entitled to hygienic water for domestic purposes (DWA 2012: 49). Ward 19, being one of the wards in this municipality, is also affected by the lack of access to hygienic water.

Figure 3.7 illustrates the source of water for residents from this municipality. This figure further reveals that a majority of the populace in Mtubatuba Municipality fetch water from the river and streams. These individuals are compelled to travel between 2000-5000 metres on foot in order to obtain water from the rivers or streams, as mentioned by a participant of this study. Though a significant amount of the populace of Mtubatuba Municipality do obtain water from the river, however, only few individuals in Ward 19 of Mtubatuba Municipality have access to the river due to distance between the river and Ward 19.

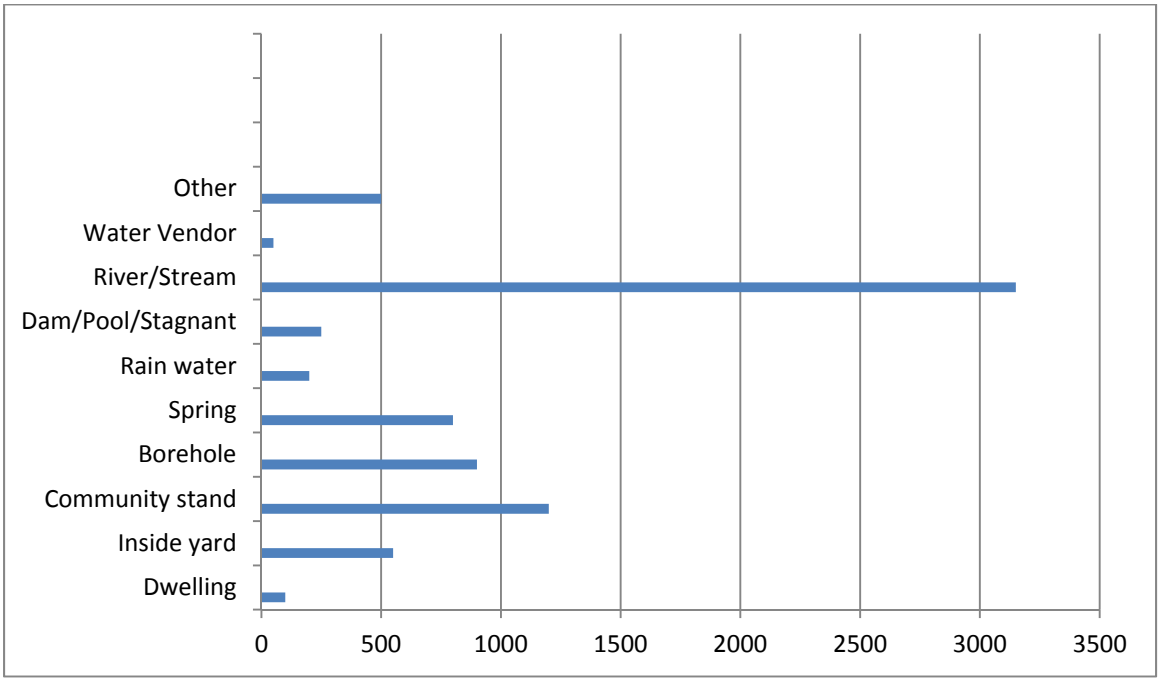
The Right to Water, Fact Sheet No. 35. (2010) compiled by the United Nations reveals that African and Asian women walk an average distance of 6000 metres (6 kilometres) to collect water. This contravenes the standards set forth by the World Health Organisation (WHO) which stipulates that the "*water source has to be within 1,000 metres of the home and collection time should not exceed 30 minutes"* (WHO 2007: 40-41).

Furthermore, the United Nation (UN) Committee on Economic, Social and Cultural Rights (CESCR), in Comment No.15, placed emphasis on the interdependence and inseparability between access to water and the right to health; the right to food and the right to life, in particular (United Nations 2009 quoted by Hellum 2014: 3-4).

Hellum (2014: 2) also mentions that General Assembly Resolution 64/292 limits the human right to water for personal and domestic purposes and does not include water for livelihood. Hellum (2014: 2) expounds that the CESCR, having identified water as a source of livelihood, recommends that rural farmers as well as other disadvantaged and vulnerable group should be given priority access to water resources for their basic need as part of their "*right to adequate nutrition and the right to earn a living through work"*. This demonstrates that the water access of

Ward 19 in the Mtubatuba Municipality does not conform to standards set by the WHO, as a significant portion of the populace is still required to walk a distance beyond 1,000 metres in search of water.

Figure 3.7: Access to water

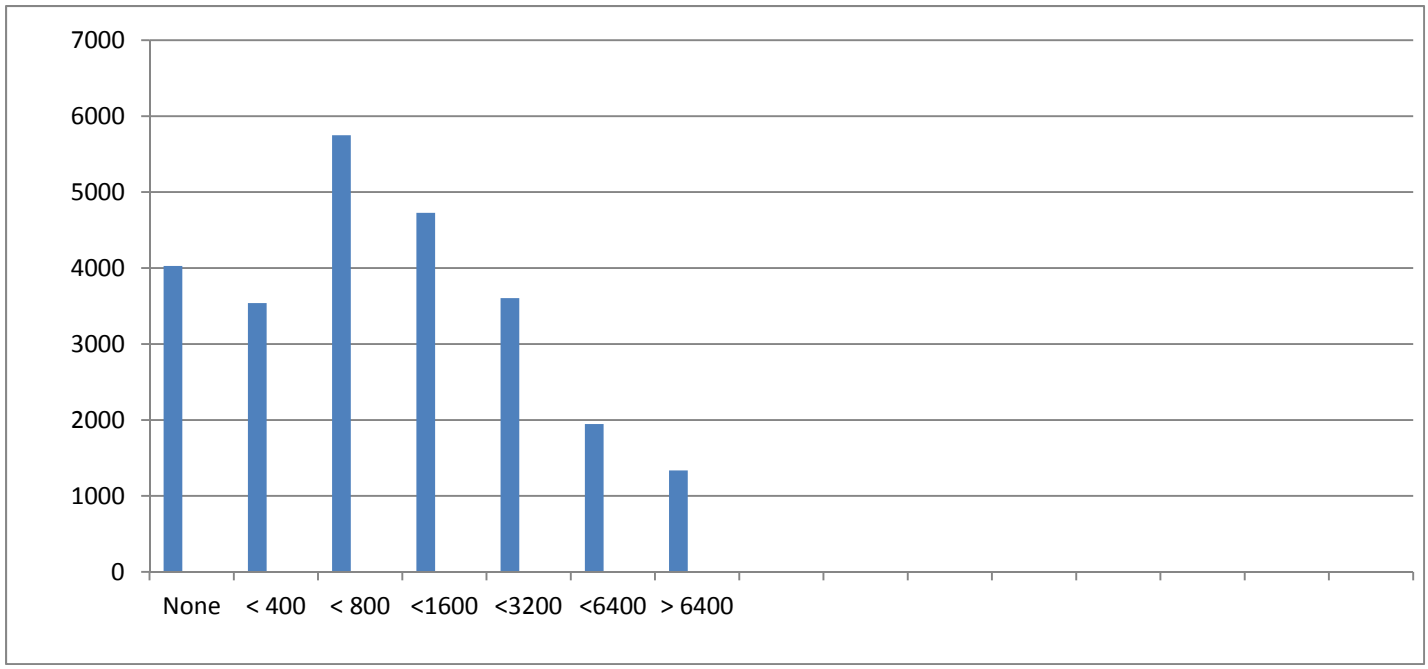


Source: Adapted from Mtubatuba Local Municipality IDP (2012: 41)

3.9.6 Income per household

Figure 3.8 highlights the extent of poverty in Mtubatuba Municipality. As indicated, over 72 % of the populace earn below R2000 on a monthly basis. Furthermore, this figure reveals that 53% of the households have no secured source of income. This implies a burden on the Department of Welfare, as a substantial amount of the budget of the municipality is allocated to social grants (Mtubatuba IDP 2012: 44). Williams (2007: 21-22) asserts that social grants have a positive correlation to standard of living in the rural area. Williams (2007: 22) adds that households who receive social grants are often more healthier than those who do not benefit from this grant.

Figure 3.8: Annual income per household



Source: Adapted from Mtubatuba Local Municipality IDP (2012: 44)

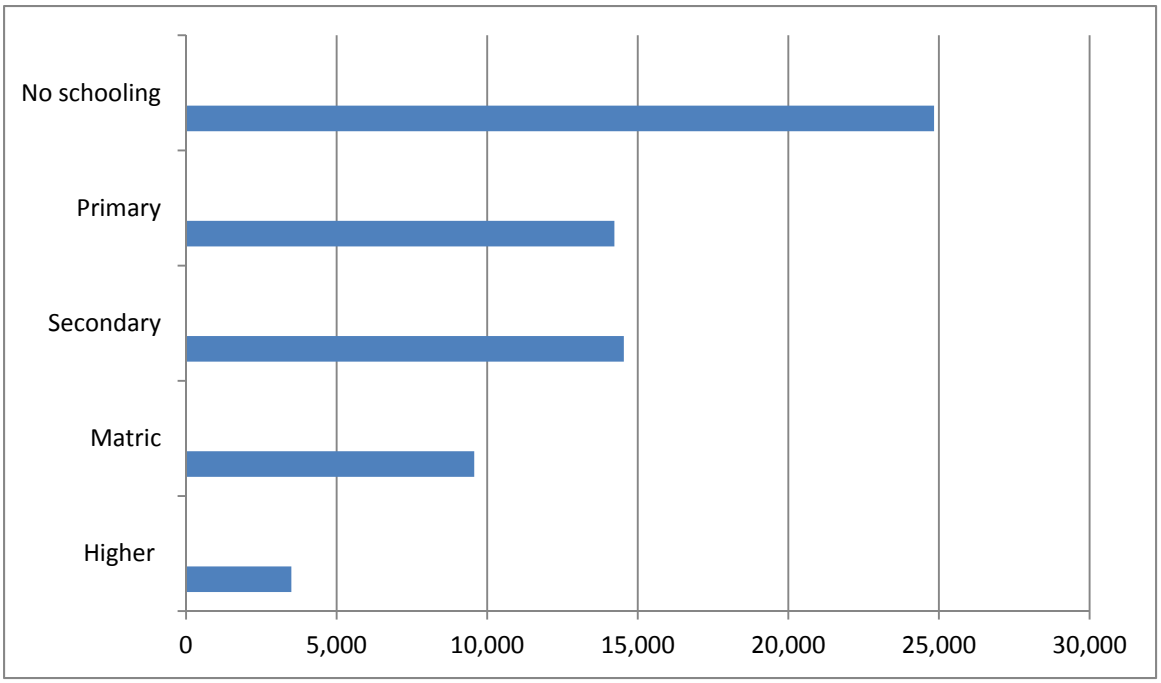
(*Note: values in the above figure are in rands*)

3.9.7 Education profile in Mtubatuba Municipality

Figure 3.9 highlights the level of education and daily activities of households in this municipal area. In summary, 37% of the populace did not have any form of schooling and 44% have some primary and secondary education. The high illiteracy in this community has a direct relationship to poverty, as this results in a lack of skills (Williams 2007: 21). Williams (2007: 21-23; 58) asserts that low levels of illiteracy amongst parents have an adverse effect on child rearing.

Furthermore, Carter and May (2003:9) argue that there exists a relationship between level of education, types of occupation (job) people engage in and their standard of living. They further mention that high levels of literacy or expertise in a field often creates more opportunities for individuals, thus offering such individuals a better chance of a high living standard. However, such is not the case in Ward 19, as a significant percentage of the populace are not educated.

Figure 3.9: Access to schooling



Source: Adapted from Mtubatuba Local Municipality IDP (2012: 39)

3.10 Water availability in Ward 19

The main challenge constraining development in Mtubatuba Municipality is the lack of adequate water for domestic, agricultural and industrial purposes. Water availability plays a crucial role in the livelihood of rural communities (Hellum 2014: 2). However, the area under study does not have access to potable water in accordance with regulated standards of the Department of Water Affairs (Mtubatuba Municipality Integrated Development Plan 2013: 42).When interviewed on the 17th of December 2013, Mr. Gumede (Technical Supervisor, Water and Sanitation, Mtubatuba) asserted that the only water source to Ward 19 is rainfall. He mentioned that the ward has no flowing rivers or boreholes. Mr Gumede further alleged that the water demand is twice the availability in this community.

The Hlaneni Landscape project initiator, Mrs. Magwaza, also mentioned that Ward 19 lacks water infrastructure and that the available water resources are being managed through traditional means, such as storage in clay pots and digging of small dams at suitable locations within the farm land.

Mrs. Magwaza also stated that the limited water available is judiciously used for domestic purposes and rearing livestock, while the bulk of this resource is used for crop production. However, the available water received through rainfall is often insufficient to sustain crops, which hinders the growth of subsistence farming. At the time of this study, the community had no water treatment plant. However, the Mtubatuba Municipality has a plan to put this in place in future (Mtubatuba Municipality Integrated Development Plan 2013: 97).

The main challenges related to water in this community include low amounts of rainfall; predominance of invasive alien plants and steep topography, whereby only little amounts of rainfall is retained after each downpour. The provision of water infrastructure will be highly costly as households are often scattered across the ward (Mtubatuba Municipality Integrated Development Plan 2013: 85).

3.10.1 Water conservation techniques used in Ward 19

Water conservation techniques used in the study area to sustain crops during the drought period include the following:

- Shift cultivation:

  Shift cultivation is a practice whereby farmers deliberately do not plant or plough on a piece of land for a specified period of time in order to regain soil fertility (Taigbenu 2010: 65).

- Rain water harvesting:

  According to Mati (2007: 26), rainwater harvesting is a water conservation technique whereby farmers obtain water directly from rainfall or surfaces such as roofs, the ground surface, rocks and other impermeable surfaces. He adds that the harvested water is stored in structures such as tanks, dams and rock catchments to provide water for agricultural and domestic purposes.

- Planting Without Ploughing (PWP);

  Planting Without Ploughing (PWP), as explained by Mrs Bridget, is a technique whereby farmers deliberately plant seeds or crops on uncultivated land. She further explains that, when farmers do not uproot the weeds or unwanted crops, the soil moisture is preserved. Thus, PWP is a technique which sustains soil fertility.

- Soil and water conservation (mulching):

  Mulching is achieved by placing crop residues and grasses on the soil surface in a cultivated field, in order to conserve moisture, reduce runoff flows and improve soil fertility (Mati 2007: 22).

As evidenced by Mrs. Magwaza (the Initiator of Hlaneni Landscape project), the highlighted water conservation techniques, when used about 10 years, would result in a considerable yield of farm produce. However in recent times, same water conservation techniques have not been able to produce substantial produce as compared to the past.

3.11 Farming projects in Mtubatuba Municipality

There are several farming projects spread across Mtubatuba Municipality. As alleged by Mr Myeza, there are an estimated 70 projects running in Mtubatuba Municipality at present. Some of these projects cover a land mass of about 40 hectares, while cultivation takes place on only one hectare and five hectares of land in other farm projects. However a majority of these farming projects are not within the confines of Ward 19, as only two of such farming projects are in this ward. As acknowledged by Mrs Bridget (Local Director of the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba), the farming projects are mainly established to sustain livelihood, underpin rural development and create employment among the populace of the municipality. As evidenced by Mrs Magwaza, these farming projects should have enhanced livelihood and rural development in the community. However, due to the unfavourable farming conditions and low yields (in many instances), some of the farmers have abandoned farming to seek employment in neighbouring towns and cities.

3.11.1 Hlaneni Landscape Project and the impact of water scarcity

Hlaneni is a community farm project run by 20 women in the Gunjaneni area of Ward 19 in Mtubatuba Municipality. The term “Hlaneni” is derived from the IsiZulu word which means traditional fruits. Prior to the commencement of this project, the farm land served as home to a variety of traditional fruits. The total project covers a land area of 40 hectares but due to the lack of resources such as farming tools and water insufficiency, only 8 hectares of land is put to use at present. This piece of farm had been in use by the community since 1987, but the Hlaneni land project only started during August 2009. As mentioned by some of the farmers maintaining Hlaneni, at the inception of this project the farm land was characterised by various species of invasive alien plants. Furthermore, it was noticed that livestock and cattle died as a result of

consuming the alien plants. In addition, the alien plants were consuming high volumes of water. For this reason, the farmers requested the support of the Department of Agriculture at the municipality to assist in eradicating the invasive alien plants. The department also provided fencing for the project as animals were found trampling on crop produce, thereby causing damage.

The major crops cultivated in this project are sweet potatoes, beans, spinach and maize, as these crops thrive mostly during the rainy period. In addition, the community is accustomed to consuming these produces as they serve as household food supplements. The importance of this project cannot be overemphasised as it has served as a means of livelihood to the 20 women running it as the Department of Agriculture (Mtubatuba) offers some stipends on a monthly basis. The farm produce also serves as food for households, thereby ensuring food security and the reduction of high rate of poverty amongst these households.

Mr. Myeza, who coordinates the Hlaneni Landscape project, stated that the farm project has several potentials, but is mainly constrained by water scarcity particularly between the months of May and August. He mentioned that, due to insufficient water, some farmers in the area of study were dissuaded from farming, resulted in poor yields in crops. Furthermore, time which might have been used for leisure or other productive activities are channelled to fetching water from far off places. Only farm produce such as dry beans can be planted at specific periods of the year.

3.11.2 Similar agricultural projects and the impact of water scarcity

This section provides insight into five similar projects to that of Hlaneni Landscape Project in other wards of Mtubatuba Municipality. The identified projects are located in Wards 1, 3, 7, 12 and 19 of Mtubatuba Municipality. The Hlaneni Landscape project was selected for this study as

it has been in existence for more years compared to other farming projects and it is amongst the largest within the municipality.

Table 3.5: Farming projects (Mtubatuba Municipality)

Ward	Ward 1	Ward 3	Ward 7	Ward 12	Ward 19
Location	Msane	Khula village	Ndombeni	Madwaleni	Machibini
Extension worker	Hlungiwe Gumede	Mrs. ZP Mthemba	Snenhlanhla Msweli	Mr Mzothule Buthelezi	Mrs Mbatha
Project name	Simunye	Ikusasalethu	Siyathuthuka project	Madwaleni	Isukamuva project
Duration of project	Four years	Six years	Three years	Seven years	four years
Size of farm	I hectare	2 hectares	2 hectares	4 hectares	1 hectare
Number of farmers	20	35	6	35	30
Crops grown	Maize, spinach, beans and carrot	Maize and lettuce	Maize, spinach, beans and carrot	Sugarcane, maize, spinach, cabbage, carrot, lettuce, tomato	Maize, spinach, beans and carrot
Water source	Only rainfall (54mm)	Only rainfall (52mm)	Only rainfall (56mm)	Only rainfall (54mm)	Only rainfall (52mm)
Major challenges	Water scarcity, animal trampling	Water shortage	Water scarcity, no fencing and insect attack	Water shortage	Water shortage

As shown in Table 3.5, the main challenge faced by the above projects is water scarcity. For this reason, water resource management is imperative to sustain and develop subsistence farming in these projects.

The same features found in Ward 19 are similar to the other highlighted farm projects. These features include soil type, type of crop grown, rainfall pattern and these projects are all also managed by community members.

3.12 Conclusion

This chapter provided a description of the study area. It gave an insight into the extent to which water scarcity and natural resources in Mtubatuba have impeded the growth of subsistence farming. The chapter also highlights the effect it has had on rural development in the community. In addition, this chapter presented a contrast between water demand and water supply in the area under study.

The next chapter focuses on the research methodology of this study.

Chapter 4: Research methodology

4.1 Introduction

The preceding chapter provided an overview of the area under study. In this chapter, methods and techniques used in conducting the research are discussed. This chapter focuses on data collection methods and instruments; sampling strategy; as well as the sample population. Aspects such as inclusive and exclusive criteria; confidentiality and anonymity; ethical clearance; and limitation of the study are also discussed.

Research methodology is a systemic approach to unravelling problems. It entails techniques by which researchers describe, discuss and predict certain phenomena. Research methodology involves the methods and procedures of the research process. It is inclusive of the following: reason why certain data was collected; what data was collected; where the data was obtained; how data was collected; and how data was analysed.

4.2 Objectives of the study

This study focused on “water resource management for subsistence farming in the Ward 19 area of Mtubatuba in KwaZulu-Natal”. The aim was to examine the role of the water supply in rural agricultural development in Ward 19 area of Mtubatuba. The current study also intended to:

- evaluate water resource management in Mtubatuba;
- assess water supply and demand in Ward 19;
- analyse the effect of water supply on subsistence farming in Ward 19; and
- make recommendations to improve water resource management in Ward 19.

4.3 Research approach

According to Parker (2004: 159), qualitative research is the study of processes and behaviours in their natural settings, through which the investigator attempts to make sense of phenomena and the meanings that people attribute to them. On the contrary, quantitative research is a study which aims to quantify attitudes and behaviours (Yin 2010: 124). De Vos (1998: 15) differentiates between qualitative and quantitative research when he mentioned that qualitative research involves data that are mainly verbal, while quantitative research usually deals with numerical data.

A mixed research approach was used in this study as information was gathered through interviews and questionnaires. Mixed methods research is the type of research in which a researcher or team of researchers combine elements of both qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and collaboration (Johnson, Onwuegbuzie and Turner 2007:123). Greene, Caracelli and Graham (1989:256) define the mixed-method design as that which includes at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is essentially linked to any particular inquiry model.

4.4 Research design

Research design, as defined by Phelps, Fisher and Ellis (2007: 80), is a plan outlining how information will be gathered for an assessment that includes identifying the data collection method(s); the research instruments to be used; how the instruments will be administered; and how the information will be organised and analysed. In Trochim's (2006: 1) opinion, research design connects all aspects of the research project together with the intent of addressing the research questions.

The discussion and description of Ward 19 provided the foundation for the researcher to decide on the most suitable research design. After careful consideration, it was decided that the most suitable approach to obtaining relevant data, while incorporating the aim and objectives of the study, was to draw up a questionnaire. The selection of this methodology for this research was guided by concerns as to how best to address the research problem, aim and objectives.

4.4.1 Sampling strategy

According to Lamdreneau (2005: 1), a sampling strategy is a plan to ensure that the sample used in a study represents the entire population. Cohen, Manion and Morrison (2007: 100) comment that the eminence of a study is dependent not only on the appropriateness of the methodology and instrumentation, but also on the suitability of the sampling strategy selected by the investigator. Cohen *et al.* (2007: 100) highlight the two types of sampling strategies, namely: probability and non-probability techniques. Leedy and Ormrod (2010: 45) explain probability sampling as a technique of randomly selecting samples from a population where each member of the population has an equal chance of being chosen. Lewis and Thornhill (2003: 159) point out the five main techniques used to select a probability sample. This includes:

- Simple random sampling;
- Systematic sampling;
- Stratified random sampling;
- Cluster sampling; and
- Multi-stage sampling.

Fox and Bayat (2007: 58) assert that, in non-probability sampling method, the elements of the population do not stand an equal chance of being chosen. Saunders, Lewis and Thornhill (2003:

159) argue that non-probability sampling techniques provide credible, suitable as well as reasonable alternatives which are liable to provide answers to investigator's inquiry. Salkind (2003: 94) identified the following non-probability sampling techniques, namely:

- Convenience sampling;
- Quota sampling;
- Purposive sampling;
- Snowball sampling; and
- Self selection sampling.

The sampling method used in this study was the non-probability sampling method using the convenience sampling method. In convenience sampling, the researcher selects the most accessible members of the population from which to obtain information. Non-probability sampling techniques rely on the subjective judgement of the researcher when selecting units from the population to be included in the sample (http://dissertation.laerd.com/articles/sampling-the-basics.php). A convenience sample can also be explained as a sampling method where the units that are selected for inclusion in the sample are the easiest to access (http://dissertation.laerd.com/articles/sampling-the-basics.php).

4.4.2 Sample

As defined by Sekaran (2006: 265), a sample population refers to the population of interest or topic of interest that the researcher intends to base a study upon. According to Bless *et al*., (2008: 99), an effective sample should have three attributes; a well- defined population; an adequately chosen sample; and an estimate of how representative of the whole population the sample is. Burns and Groove (1997: 236) also define a sample population as "*the entire aggregation of*

respondents that meet the designated set of criteria". Criteria in this context imply the specific requirements required by a researcher to conduct an investigation. The population in this study constituted 85 subsistence farmers in the Ward 19 area and the sample is 50 farmers.

4.5 Data collection

Data collection is obtaining useful information on key quality characteristics produced through a process. There are four main tools used for data collection. Data can be collected through questionnaires, interviewing of participants, observation and by reading. The researcher is required to ensure the instruments selected are reliable and valid in conducting the study. However, the reliability and validity of a study is largely dependent upon the suitability of the instruments (Annum 2014: 1). Adam (2009:13) states that primary data is information collected first hand. The data collection method in this study was through interviews, combined with questionnaires. This served as the primary data collection method. The questionnaires were hand delivered by the researcher to the 50 farmers (participants) in Ward 19 of the Mtubatuba Municipality.

4.5.1 Interviews

As defined by DePoy and Gitlin (2005: 169), an interview is a verbal communication between an investigator and a participant (or participants) of a survey, and is either structured or unstructured. The current study utilised a structured interview to gather relevant information. Yin (2010: 134) explains a structured interview as a pre-determined set of questions directed at a participant of a survey by a researcher. According to Bryman and Bell (2007: 472), an interview is one of the most frequently used techniques in qualitative research.

Using interviews in research has a number of advantages. These advantages include: the privilege of a researcher to work directly with the respondent; the opportunity to probe or ask further questions during the course of the interview; and, also, interviews are usually easier for participants (of a survey), especially if the researcher requires their perception or opinion on a certain issue. Boyce and Neale (2006: 3) also mention that interviews are useful when an investigator requires elaborate information about an individual's perception and behaviour; or when the necessity to explore new problems in an in depth manner arises. McNamara (1999 quoted by Valenzuela and Shrivastava 2008: 1) also state that interviews are helpful as follow-up to certain feedback in a questionnaire. This allows a researcher to have a better understanding of the participant's response.

On the contrary, interviews are often time-consuming (Boyce and Neale 2006: 3). Boyce and Neale (2006: 3) also add that interviews require much effort and are usually costly. In conducting this research, the researcher travelled on numerous occasions to interview individuals. Interviews were conducted with 3 senior officials from the regional office of the Department of Water Affairs in Durban; 3 staff members from the Mtubatuba Municipality; 2 individuals from Ward 19; 2 senior staff members from the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba, as well as 2 senior staff members from Umkanyakude, the water supplier for the Mtubatuba Municipality. All interviews conducted in this study were face to face interviews.

The information gathered through the structured interviews was used for triangulation purposes. The purpose of triangulation in qualitative research is to increase the credibility and validity of the results. According to Denzin (1970 cited by Kimchi, Polivka and Stevenson 1991: 1), triangulation in research is defined as "*the combination of two or more theories, data sources,*

methods or investigators in the study of a single phenomenon". The triangulation process was handled in this study by making a comparison between responses the subsistence farmers gave (in the questionnaires) with the answers obtained through the structured interviews conducted amongst the staff members of the Department of Agriculture, Mtubatuba Municipality and Umkanyankude water service provider.

4.5.2 Questionnaire

According to Brace (2008: 4), a questionnaire is a medium of communication between a researcher and a participant of a study. It is often written and used for gathering relevant information for research. Brace (2008: 4) further mentions that questionnaires are suitable research instruments as they are cost-effective and serve as an easy means of data collection from a large group. Sekaran (2006: 237) also mentions that a well-structured questionnaire should have simple wordings; the themes and variables should be well organised; and it should also have a good appearance. Rugg and Petre (2007: 144) also support Brace's view when they mention that questionnaires are suitable tools for finding out the opinion of a widespread population or large group. Kumar (2005: 130) points out that a questionnaire has several advantages. These advantages include affordability as compared to interviews. Furthermore, questionnaires are a fast and reliable means of data collection. They also offer anonymity and confidentiality. Questionnaires usually do not involve face-to-face interaction between the researcher and respondent. This has proven to be helpful when dealing with sensitive questions (issues). On the contrary, participants of a study might ignore the researcher by not completing the questionnaires. This invariably will result in a poor response rate. Also, in some circumstances, respondents might provide biased information. Both the poor responses and biased information will definitely affect the reliability and credibility of such research (Kumar

2005: 130). In this study, questionnaires were distributed to 50 subsistence farmers in the Ward 19 area of Mtubatuba Municipality.

According to Torgerson (2010: 2), a poor response rate to questionnaires often reduces the statistical strength of the study as this could reduce the effectiveness of the sample size of the study. Fosnacht, Sarraf, Howe and Peck (2013: 2) further highlight the importance of high response rates in survey research by stating that a low response rate threatens the source of information as well as the supposed utility of the data gathered. In the current study, of the 50 questionnaires distributed, 42 were filled by participants and returned. This reflects an 84 percent return rate of questionnaires. This is an ideal response rate, as Fincham (2008: 2) concludes in his study on "Response Rates and Responsiveness for Surveys, Standards, and in the Journal which states*; that an above 60 percent response rate is a reliable estimate for research purposes.*

4.5.2.1 Questionnaire design and format

The questionnaire used in this study was designed by the researcher. As highlighted in a study by Coombes (2001: 132), the presentation and sequencing of a questionnaire is important. A poorly designed questionnaire often has an adverse consequence on the credibility and reliability of the data gathered. The questionnaire used in this study comprised 5 sections, which consist of open-ended and closed-ended questions. Each of the sections was grouped according to themes. The purpose of the first theme was to address questions relating to water resource management, while the second focused on water supply and demand in the area under study. The third theme had questions on the effect of water supply on subsistence farming, while the fourth and concluding themes dealt with recommendations and general comments. The questions were structured in order to provide answers to the aim and objectives of the current study. These questions were in English, but were translated into IsiZulu for a better understanding of the respondents.

4.5.2.2 Pre-test of questionnaires

The original questionnaire was pre-tested for appropriate wording and also to check whether it was meaningful to the respondents. It was also used to verify if the questions asked are appropriate for highlighting the quality attributes and whether there was a smooth sequence of the questions from start to finish (Sekaran 2003:63). The questionnaire was pre-tested with 10 subsistence farmers in Ward 19. These 10 individuals were not part of the population sample to which the final questionnaires were administered. The feedback from the pilot study resulted in few changes from the initial questionnaire. Amongst the changes made were a reduction of the questions asked and the use of simpler sentences.

4.6 Use of IsiZulu translator in the study

According to Pitchforth and Van Teijlingen (2005: 1), cross-cultural research often requires the aid of interpreters (translators) to enhance communication between a researcher and a participant or a focus group. As mentioned earlier, some participants of this survey were IsiZulu speaking people. In order to communicate effectively, the services of translators were utilised. The services of an interpreter were required while interviewing Mrs. Sibongile Magwaza, she is the initiator of the Hlaneni Landscape project. Worth mentioning also were the Masters students from the Department of Language Practice from the Durban University of Technology who translated the questionnaires from English into IsiZulu. In addition, five interpreters played a vital role by translating the English questionnaires to IsiZulu. The services of these translators were essential as they facilitated communication between the researcher and the 50 farmers.

4.7 Inclusive and exclusive criteria

Inclusive criteria were the subsistent farmers in Ward 19 of Mtubatuba Municipality, while the exclusive criteria were the commercial farmers as well as farmers who specialise in livestock

farming in the same ward. In addition, the inclusive criteria included 3 senior officials from the Department of Water Affairs in Durban. They were the Water conservation manager; the Deputy Director, Water sector regulation; and the Water service director. The other staff members were excluded as their roles were not related to the study. Included also were the Director and the Extension officer from the Department of Agriculture, Environmental Affairs and Rural Development in Mtubatuba. The Town planner, the LED officer and the Social facilitator from the Mtubatuba municipality; as well as the Director and the supervisor of the Umkanyankude water supplying unit in Mtubatuba municipality were involved, while the other staff members of these departments were excluded.

4.8 Confidentiality and anonymity

Confidentiality and anonymity was ensured by the non-disclosure of the respondents' names in the questionnaires. Only the researcher and translator interacted with the respondents. Prior to the distribution of questionnaires, the researcher informed the participants of the study that all information would be kept confidential and would not be disclosed to any third party. Each and every participant in the study was required to complete a consent form before filling the questionnaires. In addition, to ensure confidentiality and anonymity data would be safely stored, and thereafter will be shredded 5 years after completion of this research.

4.9 Ethical clearance

Ethics in research refers to standards of conduct guiding moral choices between a researcher and participants of a study (Coldwell and Herbst 2004: 18). In addition, Coldwell and Herbst (2004: 18) state that the purpose of ethics in research is to ensure that participants of the study suffer no negative consequences that may arise from research activities. Ntlabezo and Booyens (2005: 38) also explain ethics as the quality of inquiry by a researcher, while complying with professional

principles. Professionalism in this context refers to ensuring one complies with the rules and procedures of conducting research. Hence, the researcher will not tarnish the image of the institution where the study is being conducted. Ethical requirements were complied with for this study in accordance with the Durban University of Technology ethical standards.

4.10 Data analysis

This section focused on specific types of descriptive and inferential statistics used in this research. Models, tables, figures and charts were used for analytical purposes. Inferential statistics using Pearson's and, or Spearman's correlations at a significance level of 0.05 were employed. Testing of hypotheses was done using chi-square tests for nominal data and ordinal data at a level of significance of 0.05. Internal data was analysed using t-tests or ANOVA. Primary data gathered from the interviews and questionnaires, as well as secondary data gathered from the DWA, the Mtubatuba Municipality and Department of Agriculture, Environmental Affairs and Rural Development, was analysed and used for the recommendations and conclusions. The Statistical Package for the Social Sciences (SPSS) version 22.0 was used in analysing data in this research. Bryman and Crammer (2009: 21) argue that when a researcher uses the SPSS analysis programme, the researcher is able to analyse quantitative data quickly and in many different ways, eliminating long hours spent on scores, carrying out calculations and making inevitable mistakes that occur while such calculations are carried out. Firstly, the quantitative data was analysed using descriptive statistics. The results obtained are shown by creating tables and diagrams in order to show the frequency of occurrence, as well as identifying statistical relationships between the variables. A qualitative data analysis was followed, which adds to the understanding of the role that water supply plays in the development of rural agriculture in the area under study. The questionnaire and interview was organised into

manageable themes, analysed and stored. The qualitative analysis was analysed through the use of thematic analysis. According to Braun and Clarke (2006:79), thematic analysis is a qualitative analytic method which enables researcher to identify, analyse and report patterns within the data. They further mention that the thematic analysis aids the researcher in organising and describing the set of data in an elaborate manner. Braun and Clarke (2006:80) provide six basic phases to conducting a thematic analysis; these include:

1. Becoming familiar with the data;
2. Generating initial codes;
3. Searching for themes;
4. Reviewing themes;
5. Defining and naming themes; and
6. Producing the report.

Worth mentioning is that these steps were adhered to during the course of the research.

However, to enhance the credibility and reliability of this research, a professional statistician was also employed for data analysis.

4.11 Reliability and Validity

Reliability is concerned with whether the results of the data analysis will generate the same results on other occasions or whether other observers will make similar observations and arrive at the same conclusions from the raw data (Saunnders, Lewis and Thornhill 2007:149). To ensure the reliability of data, questionnaires were translated into IsiZulu for better understanding of questions as participants of the survey were IsiZulu speaking individuals. In addition, each of the sections in the questionnaire was explained with the aid of an assistant. The researcher

ensured that respondents filled in their views without any intimation or bias. To ensure accuracy of data, a pretest was conducted with the identified interviewees and, each of the, farmers who were given the questionnaires was supervised while completing the questionnaires. This was to ascertain whether they understood the questions. Validity is the extent to which the research findings represent the real occurrence in a specific situation (Coolican 1992: 35 cited by Welman, Kruger and Mitchell 2011: 142). In order, to enhance the accuracy of information in this study, secondary data was obtained from the Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development, as well from the Mtubatuba Municipality.

4.12 Limitations of the research

Time was a limiting factor as the researcher did not have sufficient time to investigate the impact of water scarcity on other similar farm projects, which would have given the study more validity and credibility. Also, the study is limited only to one ward amongst the 19 wards in Mtubatuba Municipality. Furthermore, this study is confined to subsistence farming. This implies that the findings of this research may not necessarily be applicable to other Wards or other modes of farming, such as commercial farming or livestock farming.

4.13 Conclusion

In this chapter, the research methodology employed in the study was discussed. It provided a detailed explanation on data collection. Inclusive and exclusive criteria, ethical standard, sampling strategy and data analysis were discussed. The next chapter will present the findings of the study.

Chapter 5: Statement of findings, interpretation and discussion of the primary data

5.1 Introduction

This chapter highlights the findings drawn from the subsistence farmers of Ward 19. It presents the results and discusses the findings obtained from the questionnaires and structured interviews in this study. The data collected from the questionnaire responses was analysed with SPSS version 22.0. The result presents the descriptive statistics in the form of graphs, cross tabulations and other figures. Inferential techniques include the use of correlations and chi square test values, which are interpreted using the p-values.

5.2 The sample

In total, 50 questionnaires were despatched to the subsistence farmers in Ward 19 and 42 were returned. The questionnaires were administered to these farmers to obtain relevant information in relation to subsistence farming, water and rural development. The 84% response rate is justifiable for the current study since Fincham (2008: 2) argues that a response rate of greater than 60% is credible and reliable for research purposes. Livingston and Wislar (2012: 110) also elucidate that the higher the response rate, the lower the level of biasness. They further explain that there is no firm statistical basis for a response rate. However, Livingston and Wislar (2012: 110) assert that a response rate should be above 60%.

5.3 Reliability Statistics

The two most important aspects of precision are **reliability** and **validity**. Reliability is computed by taking several measurements on the same subjects. A reliability coefficient of 0.70 or higher is considered as “acceptable” (Gliem and Gliem 2003: 87). Crocker and Algina (1986: 116-117) define Cronbach's Alpha as a measure of internal consistency which shows how closely related a set of items are as a group. They further explain that Cronbach’s Alpha allows researchers to

estimate the reliability of a composite when the composite score variance and the covariances are known (among all its components).

The table below reflects the Cronbach's Alpha score for all the items that constituted the questionnaire. This reflects that the overall reliability score for the variables that constitute the study is high and acceptable. Hence, the results demonstrate that the questionnaire used has internal consistency and reliability.

Table 5.1: Case processing

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

"a" in the above table denotes a Listwise deletion based on all variables in the procedure.

Table 5.1 is a preliminary table indicating the number of respondents used in this analysis for reliability. This illustrates that of the 50 questionnaires distributed to the subsistence farmers, 42 were completed and returned.

Table 5.2: Reliability statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.601	2 of 5

The overall reliability score for the ordinal data was 0.601, which is *slightly* below the recommended value of 0.70. Table 5.2 illustrates that, among the five statements that constituted this section, three were eliminated due to negative covariance. Nunnally and Bernstein (1994: 9) define negative covariance as an inverse relationship between one data series and another.

Hence, the three statements eliminated showed inconsistency in the way respondents answered them.

The score could have been affected by various factors. One of such factors could be that the model is newly developed; some of the sections had a minimum number of items; and, in other instances, items had to be omitted due to negative covariances.

5.4 Section analysis

The section that follows analyses the scoring patterns of the respondents per variable per section.

The results are first presented using summarised percentages for the variables that constitute each section.

5.4.1 Water resource management

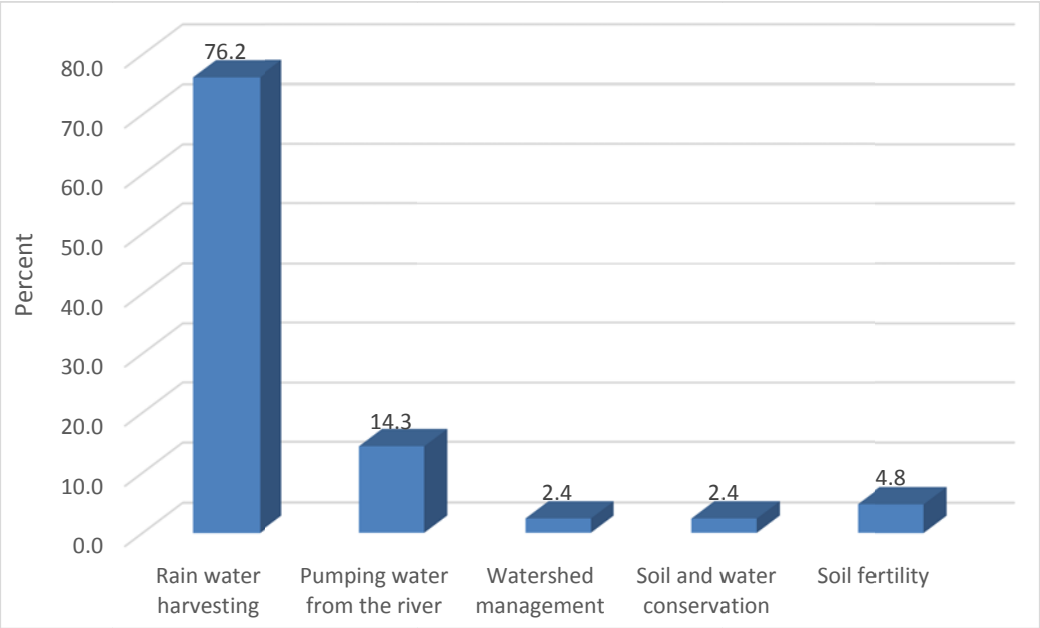
The line of questioning in this section attempted to answer research objectives linked to water conservation techniques, which are:

- Evaluating water resource management in Mtubatuba Municipality;
- Assessing water supply and demand in Ward 19;
- Analysing the effect of water supply on subsistence farming in Ward 19;
- Making recommendations to improve water resource management in Ward 19.

5.4.1.1 Water conservation techniques used by farmers

Figure 5.1 depicts the different water conservation techniques used by respondents in sustaining their farm produce.

Figure 5.1: Water conservation techniques



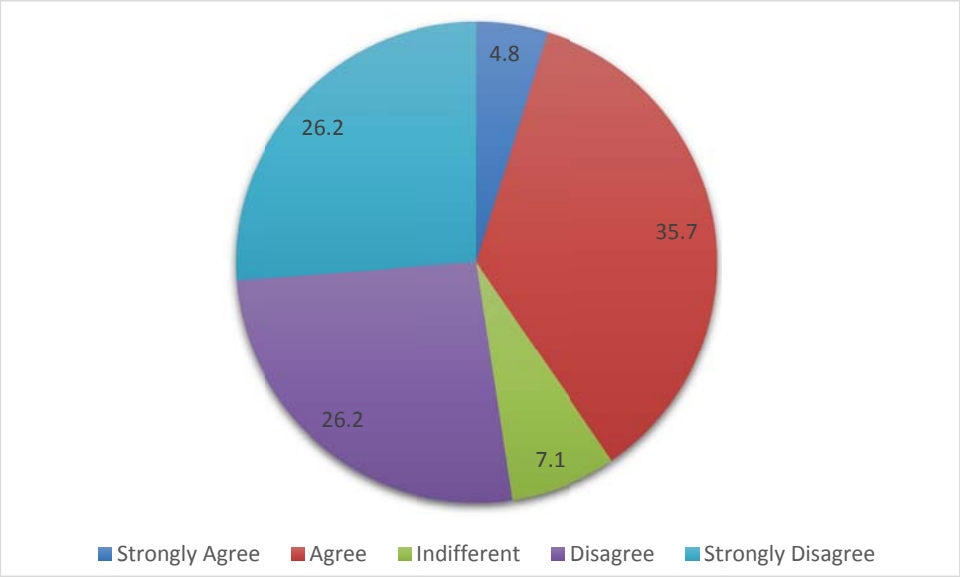
More than three-quarters of the respondents (76.2%) used rain water harvesting as their primary technique. Less than 15% used water pumped from the river, while the remaining alternatives collectively were less than 10%. The area under study receives an average of 88mm of rainfall in summer (between November and March) and an estimated 16.75mm amount of rainfall during the winter season (between May and August) (MacVicar, Loxton, Lambrechts, Roux, Villiers, Verster, Merryweather, Rooyen and Harmse 2013: 2). This implies that during the winter period, the farmers cannot use the rainfall harvesting water conservation technique. As mentioned earlier, Ward 19 is the largest ward in South Africa. Due to its size, a majority of the farmers in this community do not have access to water as there exists great distances between the ward and rivers in the locality. However, a few farmers in Ward 19 are privileged to have access to water from rivers after walking some distance. Thus, these (few) farmers can utilise the pumping of water from the river as a water conservation technique, while those who do not have rivers in

close proximity to their farm lands will rely on soil and water as well as soil fertility as a water conservation technique during the winter period.

5.4.1.2 Training of farmers on water conservation methods

The figure below reflects whether the Mtubatuba Municipality trains farmers on water conservation methods.

Figure 5.2: Training in water conservation techniques



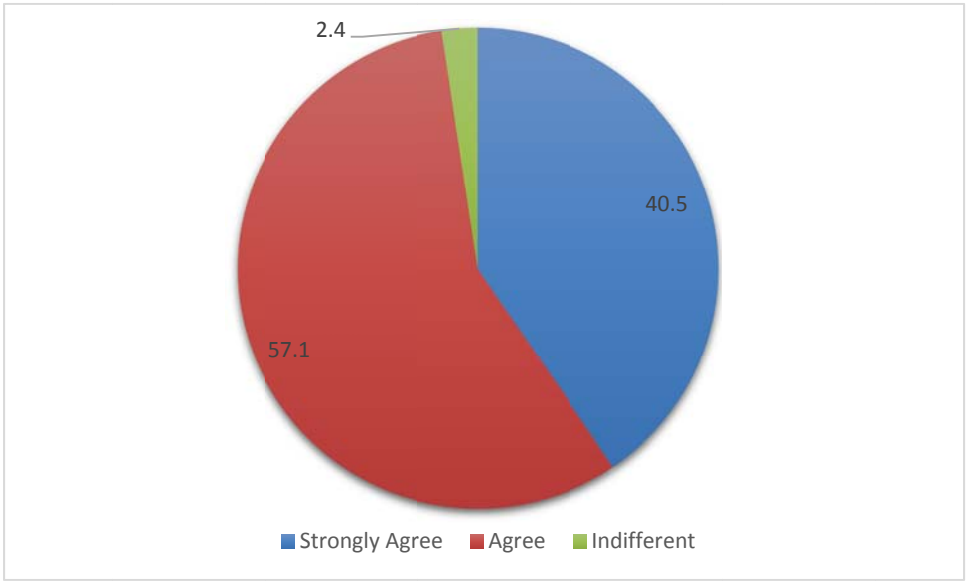
More than half of the respondents (52.4%) indicated that training was not done, with 40.5% indicating that the municipality did offer training. Amongst the respondents who stated that the Municipality do not offer training on water conservation techniques were mostly the farmers in Gunjaneni, Machi Bini and Nsolweni, while those who attested to the statement that they were being trained on water conservation techniques were farmers from Mvutshini and Ophondweni. However, Mrs Bridget Mncwango (Director to the Department of Agriculture in Mtubatuba Municipality) did acknowledge that her department does carry out a training programme on a yearly basis referred to as the Land Care Programme which is aimed at training farmers in the

Municipality on water conservation techniques. Subsistence farmers who claimed not to have been trained on water conservation techniques might not have been aware of this training programme. Hence, more awareness is required on the Land Care Programme in order to facilitate and enhance water conservation skills among farmers in Ward 19. Studies by Mathipa (2009: 54) emphasise the importance of training farmers on water conservation techniques. He explains that such training equips farmers with skills, positive attitude and knowledge which often results in better crop production and improves farmers' standard of living.

5.4.1.3 Water shortage

The figure below indicates the frequency of water shortage in Ward 19.

Figure 5.3: Frequency of water shortage



Only 2.4% of the respondents did not completely agree that water shortage was experienced often. All of the remaining respondents (97.6%) agreed that there were water shortages. Several studies have argued from different perspectives as regards the effect of water shortage on rural

livelihood. Studies by Noel, Soussan and Barron (2007: 29-30) established that there is a direct correlation between water shortage and poverty. Noel *et al.,* (2007: 39) further expound that water shortages constrains farming output which thus exacerbates poverty. A study on water shortage and poverty linkages among rural communities in Algeria by Maliki, Benhabib and Charmes (2009:10-12) also amplified Noel *et al*., (2007) position as regards the correlation between water shortage and poverty linkages. Maliki *et al*., (2009: 12) explain that a significant populace of farmers in rural communities in Algeria have faced difficulty farming during the dry seasons, as these households mainly rely on farming to sustain their livelihood. Sigenu (2006: 51-56) affirms that water shortage has an all-encompassing effect on rural lifestyle. He adds that the time spent in collecting water from streams or rivers for domestic purposes could have been used for other productive purposes or leisure. Wakeyo and Gardebroek (2012: 54-63) also maintain that water shortage undermines the growth and development of farming in rural communities. It can be deduced from the aforementioned literature that water shortage impacts on every facet of rural lifestyle. When interviewed, Mrs. Bridget Mncwango (Director to the Department of Agriculture in Mtubatuba Municipality) did attest to the respondent's claims that, water shortage is experienced often in the Ward 19 area as well as the neighbouring farming communities.

5.4.1.4 Level of improvement of water conservation technique

The table below indicates whether there had been improvement in water conservation techniques in Ward 19 in the last year.

Table 5.3: Improvement of water conservation techniques

	Frequency	Percent
Agree	8	19.0
Indifferent	4	9.5
Disagree	25	59.5
Strongly Disagree	5	11.9
Total	42	100.0

Less than a fifth (19.0%) agreed that there had been improvement in water conservation techniques for agricultural purposes. The majority of respondents (59.9%) disagreed. Table 5.3 correlates with the assertion that the traditional water conservation techniques such as mulching and rainfall harvesting are still the predominant strategies utilised by farmers in the area under study. As evidenced by one of the participants of the study, the water conservation techniques used 5-10 years back sustained crops even during the drought period. However, due to a decline in rainfall and soil degradation, such techniques do not result in good crop yields in recent years. Consequently, this has an adverse effect on the growth of subsistence farming in the locality. Contrary to the remarks made by more than 70% of the respondents who denied the improvement of water conservation techniques in Ward 19, Mr Myeza Velaphi (Extension Officer) reported that the Department of Agriculture (in the Mtubatuba Municipality) does provide drought resistant seedlings, as well as occasional training of farmers on strategies capable of sustaining crops during drought periods. The divergence of views might have been due to poor communication between the extension workers and farmers, or could be a lack of interest by farmers in learning water conservation techniques.

5.4.1.5 Source of water

The table below indicates the water source(s) used for cultivating crops. The percentages are determined with respect to the total.

Table 5.4: Water source used for crop cultivation

	Rainfall	Dam	Borehole	River
Rainfall	30 (71.4%)			
Dam	5 (11.9%)	13 (31.0%)		
Borehole	0 (0.0%)	0 (0.0%)	0 (0.0%)	
River	2 (4.8%)	4 (9.5%)	0 (0.0%)	8 (19.0%)

As illustrated in Table 5.4, 71.4% of the respondents used rainfall only. The cross-tabulation values indicate other combinations. The table reveals that 9.5% of the respondents use a combination of water sourced from dams and rivers to sustain their crops; 19% of the respondents also use a combination of water sourced from rainfall and rivers to sustain their crops; while no combination exists for respondents who sustain their crops using water sourced from rivers and boreholes. However, it should be noted that the majority of the farmers in Ward 19 do not have the privilege to obtain water from the river due to the great distances between the river and where most of the farmers are settled. Furthermore, as shown in Table 5.4, the majority of the participants rely on rainfall to sustain their crops. However, the area under study only receives an average of 20mm of rainfall for a duration of six months during the year, which does not suffice the required amounts of water needed for crop production ((MacVicar, Loxton, Lambrechts, Roux, Villiers, Verster, Merryweather, Rooyen and Harmse 2013: 2). Comments made by Mr Velaphi uphold the claim that most of the farmers rely mainly on rainfall to sustain

their crops. He acknowledged that there were no dams, boreholes or rivers in close proximity to the area of study which are easily accessible to the majority of the farmers of the community.

5.4.1.6 Bill for water usage

None of the respondents were billed for water usage as indicated by the table below. No participant is being billed for water usage as the Mtubatuba Municipality does not provide water either for agricultural or domestic purposes to the Ward 19 community. Mr Gumede attest to the fact that, as at the time of this study, no water reticulation was available in the area of study.

Table 5.5: Frequency of respondents billed for water usage

	Frequency	Percent
No	42	100.0
Yes	0	0

A report by the Department of Water Affairs (DWA) (2012: 22) alleges that the department has been able to reduce water supply (backlogs) from 41% in 1994 to 5% in 2012. However, despite the efforts made by the DWA in reducing the backlog of water supply, communities such as Ward 19 and surrounding communities have not fully benefitted from the new infrastructure in post-apartheid South Africa. The difficulties experienced by the marginalised people of Ward 19 are typical of many rural communities across South Africa (Philips 2011: 3-6). Empirical studies claim that the lack of adequate water access by rural communities in South Africa are one of the major impediments to development amongst these communities (Jagals 2012: 89-94; Fobosi 2013: 2-3). This implies that the non-provision of water supply by the municipality has an impact on development in Ward 19. Mr Joseph Gumede (Technical Supervisor to Water and Sanitation-Mtubatuba Municipality) did concede to the claim of the participants that they were not being billed for water usage as there was no water supply from the municipality. When interviewed on 4th February 2014, Mr C.V Mkhwanazi (Councillor to Ward 19) also confirmed that there was no

water supply for the area under study. However, he acknowledged that water reticulation and infrastructure construction was underway. He added that this multimillion rand project will be completed by the third quarter of 2016 and will provide the disadvantaged community with access to water.

5.4.1.7 Test statistics

To determine whether the differences between the options for each statement were significant, chi-square tests were done by variable (statement). The null hypothesis tested the claim that there were no differences in the scoring options per statement. The results are shown below.

Test Statistics

	What water conservation technique do you use?	The Mtubatuba Municipality trains farmers on water conservation methods	Water shortage is experienced often	There has been improvement in water conservation techniques in Ward 19 in the last year
Chi-Square	84.905[a]	15.143[a]	19.857[b]	27.524[c]
Df	4	4	2	3
Asymp. Sig.	.000	.004	.000	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 8.4.
b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 14.0.
c. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 10.5.

Since all of the significant values (p-values) are less than the 0.05 level of significance, it implies that the distributions were not even. That is, the differences between the levels of agreement were significant.

5.5.1 Water supply and demand

In an attempt to ascertain water supply and demand in the area under study, questions relating to specific purposes of water usage were posed; amounts of water used on daily basis per individual were ascertained; and the major causes of water scarcity in the community were discussed. This

section also probes alternative water sources used by these subsistence farmers during drought periods.

5.5.1.1 Agricultural usage of water

This question was asked to determine for what agricultural purposes the participants use water. The responses are shown in Table 5.6

Table 5.6: Water usage

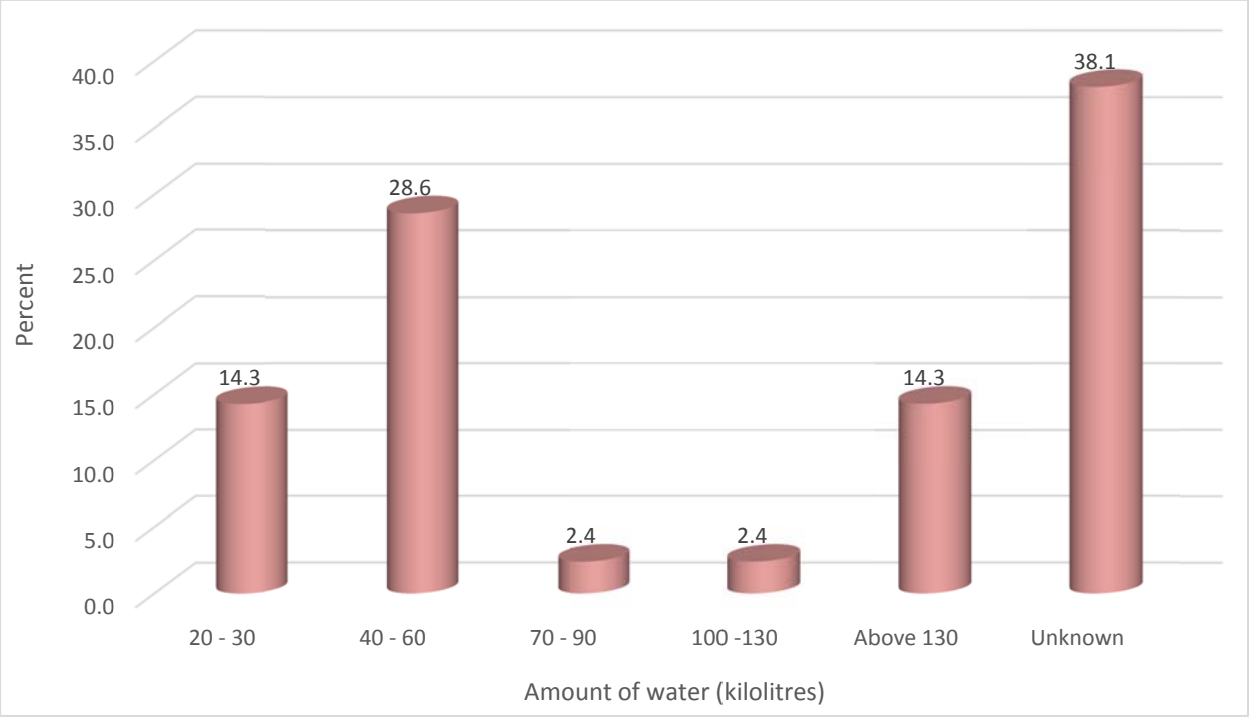
	Frequency	Percent
Growing vegetables only	33	78.6
Growing vegetables, rearing livestock and cattle	9	21.4
Total	42	100.0

A little more than three-quarters of the respondents (78.6%) use water solely for growing vegetables. The remaining respondents also included livestock in their need for water. The responses provided by participants concur with existing literature. Studies by Schreiner, Tapela and Van Koppen (2010: 3-17), as well as that of Jagals (2010: 87-93), substantiate the participants responses as they mention that rural farmers in South Africa often use water for cultivating vegetables. Sustainable agriculture is the activity in Ward 19. Therefore, it is critical for this community to have access to a water supply

5.5.1.2 Water usage on a daily basis for agricultural purposes

This section established the estimated quantity of water used on a daily basis by participants of the study. The responses provided are illustrated in Figure 5.4.

Figure 5.4: Daily water usage

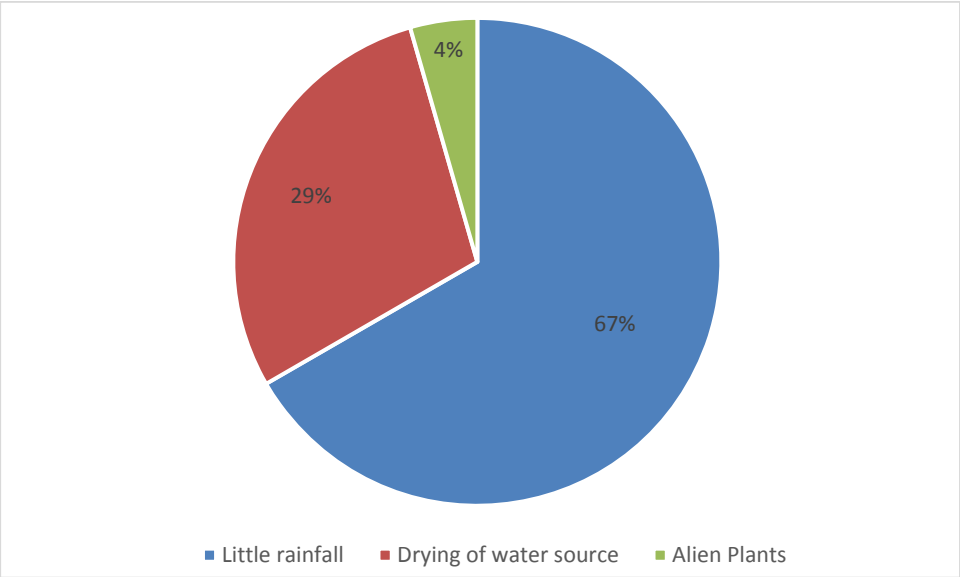


More than a third of the respondents (38.1%) were not aware of the quantity of water used. Among the respondents, 45.3% used less than 100 litres. However, when the researcher probed further, the farmers in this locality stated that Ward 19 is a water stressed settlement, as the available water does not suffice the required amount of water needed for agricultural purposes. In Mr Gumede's opinion, the community of Ward 19 and other surrounding communities require twice the available water. Thus, it can be deduced that the area under study requires much more than the water available for agricultural purposes.

5.5.1.3 Causes of water shortage

This question was posed to determine the major causes of water shortage in Ward 19. The participant's views are reflected in Figure 5.5.

Figure 5.5: Causes of water scarcity



The majority of respondents (67%) indicated that low rainfall was the major concern. Another group of respondents assert that the drying of the water source (29%) was the main cause of water scarcity. Furthermore, 4% of respondents claim that one of the major causes of water scarcity is the invasive alien plants. They argue that these plants consume a significant proportion of water which should be used for crop cultivation. Studies conducted by Blignaut (2007:28), as well as that of the United Nations Environment Programme (2010: 43), attest to participants' responses when they mention insufficient rainfall, climate change, pollution and invasive alien plants as the key contributing factors causing water scarcity in South Africa. Evidence given by Mr Thobelani Mchunu (Soil Scientist- Mtubatuba Municipality) on the 9th February 2014 reinforces the participants claim when he admits that the municipality often records low rainfall during the winter months. He further adds that the variety of species of alien plants found within the municipality contributes to the decline of water resources.

5.5.1.4 Alternatives to water sources for domestic purposes

The question was asked to determine if the farmers in the area of study have alternative water sources for domestic usage during drought period. Table 5.7 illustrates this.

Table 5.7: Alternatives to water sources

	Frequency	Percent
No alternative	24	57.1
Dam	13	31.0
Community tank	3	7.1
River	2	4.8
Total	42	100.0

Approximately 60% of the respondents indicated that there were no alternatives, whilst the remaining respondents depended on natural resources and collected water. The findings from this study correlate Jagal's (2012: 14) who suggested that households in rural communities across South Africa source their water primarily from rivers, streams, surface water and ground water, which are partly dependent on rainfall. However, the scenario in Ward 19 does not conform to the human right to water which stipulates that all individuals should have the right of access to water of sufficient cleanliness and in sufficient quantities to meet individual needs. "*As a minimum, the quantity must suffice to meet basic human needs in terms of drinking, bathing, cleaning, cooking and sanitation"* (Gleick 1999: 1; World Health Organisation 2009). The WHO (2009) acknowledges that human right to water and sanitation and recognised that clean drinking water and sanitation are essential to the realisation of all human rights (United Nations Department of Economic and Social Affairs (UNDESA) 2014: 2). Furthermore, the Bill of Rights under Article 1, Equality rights states the following:

(1) *"All South Africans are born free and equal in dignity and rights"*

(2) *"No individual or group shall receive privileges or be subjected to discrimination, domination or abuse on the grounds of race, colour, language, gender, or creed, political or other opinion, birth or other status"*(http://www.anc.org.za/show.php?id=231). This implies that irrespective of where South African citizen reside within the country, they are entitled to equal rights and privileges. However, this right has not been implemented at Ward 19 and other rural communities in Mtubatuba Municipality. Jagals (2012:14) further adds that some rural communities have been provided with communal taps on standpipes by their respective local municipalities. However, such provision have not been made in the area under study. Hence, most farmers in this locality rely on irregular rainfall to sustain their living.

5.5.1.5 No water supply for agricultural purposes

All of the respondents indicated that the municipality did not supply water for agricultural purposes. Participants' responses correspond with a report contained in the Mtubatuba Municipality Integrated Development Plan (IDP) commenting that water is not supplied to communities within the rural municipality for agricultural purposes due to high costs of supply, lack of infrastructure and settlement pattern (Mtubatuba Municipality IDP 2011: 65-67).

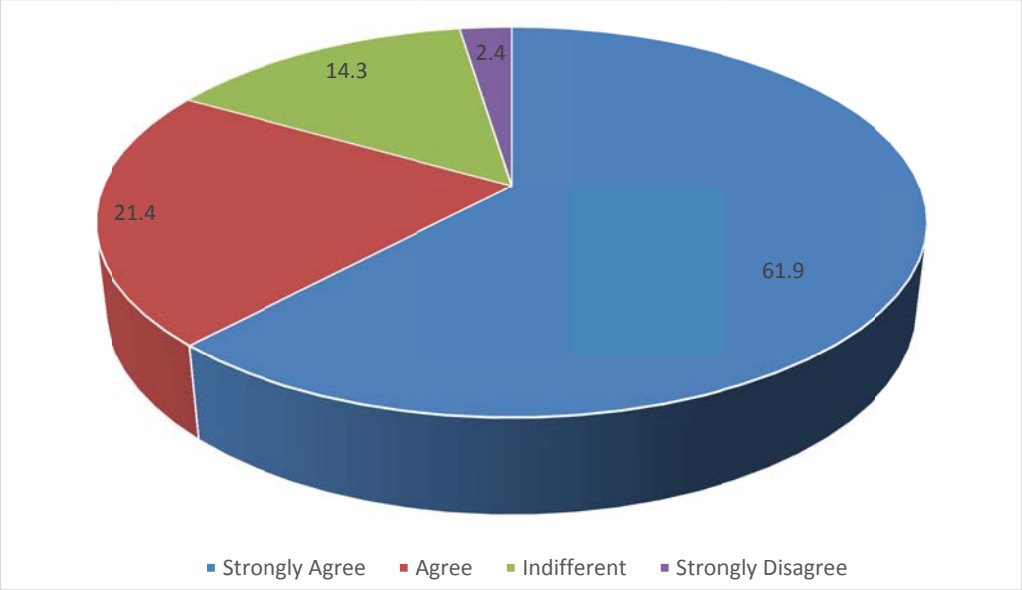
5.5.2 Effect of water supply on subsistence farming

This section looks at the effect of water supply on subsistence farming. The statements were made to participants of the study included "insufficient water supply is the main constraint to development of subsistence farming in Ward 19"; "there has been an improvement in water supply for subsistence farming in the last year in Ward 19"; "which crops do you cultivate"; and "which of your crop produce requires the most water".

5.5.2.1 Effect of insufficient water supply on subsistence farming

The participants of the study were asked if insufficient water supply is the main constraint to development of subsistence farming in Ward 19. This question was posed to determine if insufficient water was the major constraint to subsistence farming in Ward 19.

Figure 5.6: Effect of insufficient water supply on subsistence farming



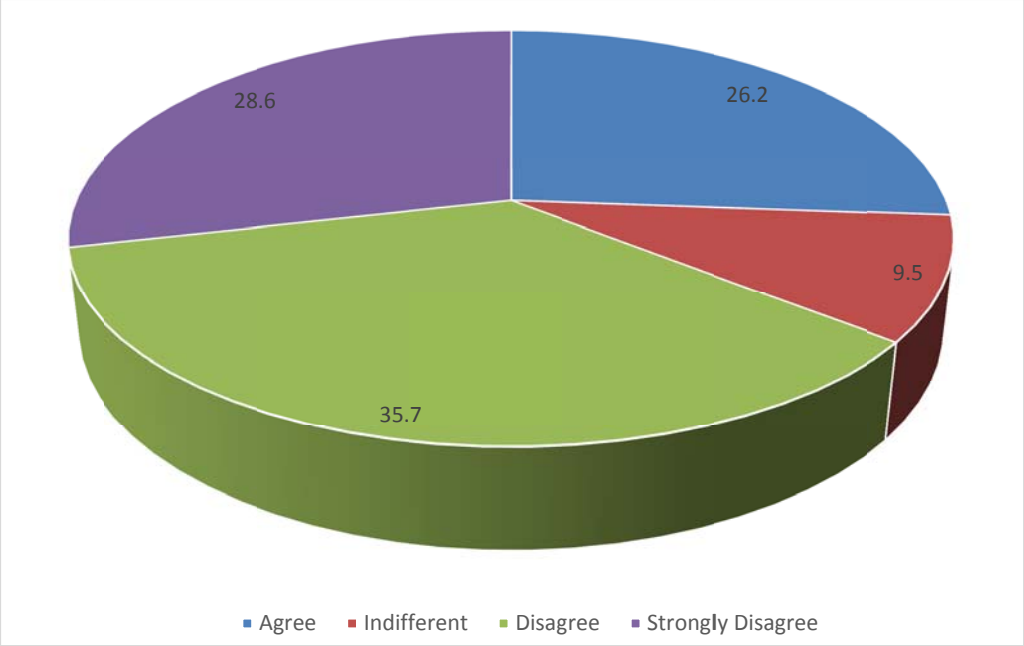
More than 83% of the respondents agreed that lack of water is the primary constraint to subsistence development. Feedback obtained from the farmers of Ward 19 of Mtubatuba agrees with other literature (Schreiner and Van Koppen 2010; Van der Merwe 2011; Oostendorp and Zaal 2011). Studies conducted by the Organisation for Economic Co-operation and Development (OECD) (2006: 10-12) established that South African climatic conditions (inclusive of rainfall) are not favourable to agricultural production in most parts of the country. The OECD (2006: 12) further adds that only 16% of the agricultural area is potentially arable, while significant proportions are water-scarce regions. The OECD also mentions that besides the winter rain region in Western Cape, other regions are characterised by water scarcity while yet other

agricultural areas are faced with chronic water scarcity. Van der Merwe's (2011: 6) finding also concurs with that of the OECD when he identified water scarcity as the main impediment to subsistence farming amongst rural communities in South Africa.

5.5.2.2 Assessment of water supply for subsistence farming in Ward 19

The farmers were asked if there had been improvement in water supply for subsistence farming purposes in the last year in Ward 19. This question was asked to verify if there had been any significant improvement in water supply for subsistence farming in this farming community.

Figure 5.7: Assessment of water supply



Nearly two-thirds (64.3%) of the respondents disagreed that water supply has improved. The majority of respondents indicated that there had been no improvement in water supply for farming purposes. It can be deduced from this feedback that to develop subsistence farming in this community, strategies or techniques are required to provide additional water for subsistence farmers in order to facilitate development in this mode of farming. This view is supported by

Menale, Moti, Bekele Mmbando, Mekuria and Mulugetta (2012); Oostendorp and Zaal (2011); and Aklilu and Jan (2007) who are of the opinion that one of the most sustainable approaches to developing subsistence farming in rural communities is by training farmers on (and developing) water conservation techniques. Supplementary water is thereby generated for farmers for productive purposes. Hence, the Department of Agriculture (Mtubatuba Municipality) initiated the Land Care Programme as a means of training farmers within the municipality on water conservation techniques.

5.5.2.3 Crops cultivated

The question posed in this section was to determine the combination of crops cultivated by the subsistence farmers of this locality. The table below is a frequency count of the number of respondents that cultivate different types of crops. To obtain the percentage value of each of the crops cultivated, the frequency of cultivated crop is divided by 210.

Table 5.8: Type of crop cultivated

	Only Maize	Only Sugarcane	Only Beans	Only Tomato	Potato or Cabbage
Only Maize	39				
Only Sugarcane	16	18			
Only Beans	23	10	23		
Only Tomato	17	8	15	17	
Potato or Cabbage	6	3	4	3	8

Nineteen percent (19%) of the respondents grew maize only and 8.6% growing only sugarcane. The cross-tabulations indicate combinations of crops grown. For example, 27.1% of respondents grew a combination of tomato, maize, sugarcane and beans (17 + 8 + 15 + 17 ÷ 210); 26.6% of

respondents grew a combination of beans, maize and sugarcane (23 + 10 + 23 ÷ 210); 11.4% of respondents grew a combination of potato (cabbage), maize, sugarcane, beans and tomato (6 + 3 + 4 + 3 + 8 ÷ 210), while only 16.1% grew a combination of sugarcane and maize (16 + 18 ÷ 210). The participants of the study based their choice of crop combination on the fertility of soil; the survival rate of the crop; present climatic conditions, as well as the value of the crop cultivated.

5.5.2.4 Crops which require the most water supply

This section identified which crops required the most water from among the cultivated crops in the area under study. Responses provided by participants are illustrated in Table 5.9. The table below is a frequency count of the water-intensive crops identified by the respondents.

Table 5.9: Intensity of water requirement by crop

	Only Maize	Only Sugarcane	Only Beans	Only Tomato	Others
Only Maize	9				
Only Sugarcane	1	13			
Only Beans	2	1	7		
Only Tomato	1	3	1	12	
Others	1	3	2	1	10

As illustrated in Table 5.9, the crops which require the most water are Sugarcane, Tomato and Maize. However, participants did mention that there are basically two types of sugarcane. One is the N21 which survives with very little water, while the other type is N19 which requires a substantial amount of water to produce a good yield. The respondents also revealed that only the N21 sugarcane is cultivated in the farming community due to water shortage. In addition, the participants also identified the high-value crops (Sugarcane, Tomato and Maize) as those which

require a high quantity of water to produce a good yield. However, water shortages have drastically impacted on these crop yields in recent years. Other crops cultivated in Ward 19 by the subsistence farmers include cabbage, potatoes and millet.

The table below is the chi-square test results for the statements therein.

Test Statistics

	Insufficient water supply is the main constraint to development of subsistence farming in Ward 19	There has been an improvement in water supply for subsistence farming in the last year in Ward 19	Others
Chi-Square	33.619	6.190	.800
Df	3	3	2
Asymp. Sig.	.000	.103	.670

The highlighted value indicates that the difference between the levels of agreement and disagreement was significant.

5.5.3 Recommendations

This section summarises the recommendations obtained from the participants of the study.

5.5.3.1 Recommendations to improve water conservation

The first question posed in this section was - “What recommendations can you make to improve water conservation for subsistence farming in Ward 19”? The participants’ recommendations are depicted in Table 5.10.

Table 5.10: Recommended water conservation techniques for subsistence farming

	Frequency	Percent
Planting water resistant crops	9	21.4
Building dams	9	21.4
Planting Without Ploughing (PWP)	2	4.8
Mulching	8	19.0
Permaculture	2	4.8
Training farmers on water conservation techniques	3	7.1
Prevention of livestock from dam	1	2.4
Windmill	1	2.4
Water reuse	5	11.9
Water harvesting	1	2.4
Fertilizer application	1	2.4
Total	42	100.0

The suggested techniques with the highest frequencies were “Planting water resistant crops” and building dams”. These two suggested techniques accounted for 42.8% of responses. The subsequent recommended techniques were mulching (19.0%) and Water reuse (11.9%); while 26.3% accounted for the remaining seven suggested techniques. These proposed recommendations are plausible as subsistence farmers in the eastern and southern Africa have utilised these techniques and it has resulted in good farm yield (Kassam, Friedrich, Shaxson and Pretty 2009:32; Mati 2007: 23-29). However some of these strategies have their shortfalls (Planting water resistant crops and PWP). Some other techniques are not affordable for the farmers. The farmers of Ward 19 have a restricted income because their main source of livelihood is subsistence farming, which barely suffices their daily demands. Hence, these farmers are unable to afford expensive water conservation techniques such as the construction of windmills. Furthermore, adopting the “Planting water resistant crops” technique will imply a limitation to the crops that can be cultivated, as only crops such as dry beans will be cultivated.

Furthermore, building a dam is far beyond the farmers' affordability. For these reasons, this study advocates more advanced and affordable water conservation techniques such as Drum drip kits and the Zabo system of farming (refer to Chapter 6).

5.5.3.2 Recommendations to sustain crops during water shortage

Opinions of participants were solicited as to what strategy was most suitable to sustain crops during drought. Their recommendations are illustrated in Table 5.11.

Table 5.11: Recommendations for sustaining crops during water shortage

	Frequency	Percent
Planting water resistant crops	4	9.5
Building dams	2	4.8
PWP	6	14.3
Mulching	20	47.6
Permaculture	5	11.9
Windmill	1	2.4
Water re-use	3	7.1
Rain Harvesting	1	2.4
Total	42	100.0

Amongst the respondents, 47.6% indicated that they used mulching as a means of sustaining their crops during drought period, while 14.3% subscribed to Planting Without Ploughing (PWP) as an intervention to sustain crops during drought periods. As explained by Mrs Bridget, the P is a technique whereby farmers deliberately plant crops on untilled farm lands in order to retain soil fertility. Furthermore, 11.9% of the respondents indicated Permaculture as a technique of sustaining their farm produce during drought periods, and 9.5% of respondents chose Planting water resistant crops. Studies by Edmeades (2008: 7) and Uga, Sugimoto, Ogawa, Rane, Ishitani, Hara and Yano (2013:11) assert that planting water resistant crops is a strategy to sustain crops during drought period. However, the farmers output and land usage is adversely affected and

only crops such as dry beans, oil seed and other genetically modified crops are cultivated during this dry period. The remaining 16.7% of respondents identified Water re-use (7.1%); Building dams (4.8%); Rain harvesting (2.4%) and Windmill (2.4%) technique(s) as a strategy to sustain crops during drought periods. However, some of these suggestions, such as windmill and dam construction, are beyond the financial means of this community.

5.5.4 General comments

Some of the general comments made by the respondents are depicted below.

5.5.4.1 Changes desired by farmers from the authority

Respondents were asked what changes they will want the authority to make in relation to water supply for subsistence farming. The responses obtained are summarised in Table 5.12.

Table 5.12: Changes desired by subsistence farmers from the authority

	Frequency	Percent
Build dams	23	54.8
Water provision for all farms in the locality	1	2.4
Provide irrigation	17	40.4
Sponsor water tanks	1	2.4
Total	42	100

As shown in Table 5.12, 54.8% of the farmers who participated in the study wanted the government at the municipal level to create dams in close proximity to their farm projects. Provision of dams will grant the farmers the privilege of having a constant supply of water in sustaining their crops all through the year. Also, 40.5% of the participants wanted the authority

to provide irrigation as a means of sustaining their crops all year round, while 4.8% desired a steady supply of water to all farms within the locality and the sponsoring of water tanks. When Mr Velaphi was asked about the feasibility of providing irrigation for the farming communities, he did explain that it was possible as the groundwater was easily accessible. However, he clarified that the irrigation project was beyond the Department of Agriculture's budget. In addition, Mr C.V Mkhwanazi (Councillor to Ward 19) did explain that supplying water with water tankers to most of the farming communities in Ward 19 was not feasible mainly due to the poor routes leading to the farms and related cost constraints.

5.5.4.2 Main constraints to the growth and development of subsistence farming

The participants of the study were asked what the major impediments to the development and growth of subsistence farming in Ward 19 were. Their views are shown in Table 5.13.

Table 5.13: Factors impeding growth and development of subsistence farming

	Frequency	Percent
Water shortage	24	57.1
Planting Without Ploughing	1	2.4
Livestock encroachment on farm land	4	9.5
High amounts of sunlight intensity	3	7.2
Lack of farming tools	5	11.9
Prices of food items in the market place (shops)	1	2.4
Alien plants	4	9.5
Total	42	100

More than half of the participants identified water shortage as the major impediment to subsistence farming in the area of study. Some also cited a lack of farming tools (11.9%), while others identified livestock encroachment (9.5%) as the main constraint to subsistence farming in the locality. Another 9.5% of respondents cited encroachment of Alien plants as an impediment

to subsistence farming in the locality. Some of the other identified impediments to subsistence farming were High amounts of sunlight intensity (7.1%); Planting Without Ploughing (2.4%) and the competitive Prices of food items in the market place (2.4%). As evidenced by Mrs Magwaza, the majority of the harvest are consumed by the households involved in farming. However, in some instances, some of the farm produce is sold to the commuters within the Mtubatuba township. Sales of farm produce is often quite challenging to the subsistence farmers of Ward 19 as they often compete with commercial farmers who are able to sell at a cheaper price. Although factors such as a lack of farming tools, livestock encroachment and encroachment by alien plants are not the main impediments to the growth and development of subsistence farming in Ward 19, if these issues were addressed, it can result in improved farming in this community.

A lack of farming tools as a constraint to the development of subsistence farming is in line with Fan, Brzeska , Keyzer and Halsema's (2013: 4-12) argument. They stressed in their study that the inability of rural farmers to acquire farming implements has adversely affected the growth of subsistence farming. In addition, empirical studies also concede to the statement – "water shortage is one of the prime constituents constraining the development of subsistence farming in South Africa" (Wichelns and De Fraiture 2010; Namara, Hanjra, Castillo, Ravnborg, Smith and Van Koppen 2010; Moldenm Oweis, Steduto, Bindraban, Hanjra and Kijne 2010). In addressing some of these impediments to subsistence farming in the area under study, Mrs Bridget Mncwango did state that the Department of Agriculture did provide tractors to uproot a significant amount of alien plants in the community. She also added that fences have been provided to some farming projects in order to prevent livestock from trampling upon cultivated crops.

Table 5.14: Correlations

		The Mtubatuba Municipality trains farmers on water conservation methods	Water shortage is experienced often	There has been improvement in water conservation techniques in Ward 19 in the last year	Give an estimated amount of water used daily for agricultural purposes in Ward 19 (in kilolitres)?	Insufficient water supply is the main constraint to development of subsistence farming in Ward 19?	There has been an improvement in water supply for subsistence farming in the last year in Ward 19?	What recommendations can you give to sustain crops during water shortage?	What are the main factors affecting the growth and development of subsistence farming in Ward 19?
The Mtubatuba Municipality trains farmers on water conservation methods	Correlation Coefficient	1.000							
	Sig. (2-tailed)								
	N	42							
Water shortage is experienced often	Correlation Coefficient	-.430**	1.000						
	Sig. (2-tailed)	.004							
	N	42	42						
There has been improvement in water conservation techniques in Ward 19 in the last year	Correlation Coefficient	.240	-.208	1.000					
	Sig. (2-tailed)	.126	.186						
	N	42	42	42					
Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?	Correlation Coefficient	.360*	-.452**	.299	1.000				
	Sig. (2-tailed)	.019	.003	.055					
	N	42	42	42	42				
Insufficient water supply is the main constraint to development of subsistence farming in Ward 19?	Correlation Coefficient	.097	.078	-.161	-.198	1.000			
	Sig. (2-tailed)	.541	.623	.309	.209				
	N	42	42	42	42	42			
There has been an improvement in water supply for subsistence farming in the last year in Ward 19?	Correlation Coefficient	.441**	-.197	.256	.399**	-.050	1.000		
	Sig. (2-tailed)	.003	.210	.102	.009	.755			
	N	42	42	42	42	42	42		
What recommendations can you give to improve water conservation for subsistence farming in Ward 19?	Correlation Coefficient	.147	-.144	.212	.457**	-.209	.353*		
	Sig. (2-tailed)	.354	.361	.179	.002	.184	.022		
	N	42	42	42	42	42	42		
What are the main factors affecting the growth and development of subsistence farming in Ward 19?	Correlation Coefficient	.243	-.324*	.328*	.134	.047	.013	.214	1.000
	Sig. (2-tailed)	.122	.036	.034	.397	.768	.935	.173	
	N	42	42	42	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Note: A correlation table containing all variables is found in the Appendix

The results indicate the following patterns:

Positive values indicate a directly proportional relationship between the variables and a negative value indicates an inverse relationship. All significant relationships are indicated by a * or **.

5.6 Discussions on correlation

The correlation value between “There has been an improvement in water supply for subsistence farming in the last year in Ward 19?” and “Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?” is 0.399. Furthermore, the correlation value between “The Mtubatuba Municipality trains farmers on water conservation methods?” and “There has been an improvement in water supply for subsistence farming in the last year in Ward 19”? is 0.441. Thus, this also implies a direct proportionality between the two variables. Participants of the study agree that if the municipality trains farmers on water conservation techniques, there will be an improvement in water supply for subsistence farming within the farming community.

Negative values imply an inverse relationship. That is, the variables have an opposite effect on each other. For example, the correlation value between “Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?” and “Water shortage is experienced often” is -0.452. That is, the more often water shortages are experienced, the less accurate would be the estimate of water used for agricultural purposes, and vice versa.

5.7 Proposed regression model

The analysis of the data in the previous sections revealed significant relationships and the researcher decided to do further statistical testing by using linear regression analysis techniques.

The variables chosen are important. They do in fact have an impact on the dependent variable. The essence of the proposed model is to make forecasts.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	There has been improvement in water conservation techniques in Ward 19 in the last year, The Mtubatuba Municipality trains farmers on water conservation methods[b]	.	Enter

a. Dependent Variable: There has been an improvement in water supply for subsistence farming in the last year in Ward 19

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.445[a]	.198	.157	1.067

a. Predictors: (Constant), There has been improvement in water conservation techniques in Ward 19 in the last year. The Mtubatuba Municipality trains farmers on water conservation methods.

The R^2 value indicates that 20% of the variation in the dependent variable can be explained by changes to the independent variables.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.959	2	5.480	4.816	.014[b]
	Residual	44.374	39	1.138		
	Total	55.333	41			

a. Dependent Variable: There has been an improvement in water supply for subsistence farming in the last year in Ward 19?

b. Predictors: (Constant), There has been improvement in water conservation techniques in Ward 19 in the last year, The Mtubatuba Municipality trains farmers on water conservation methods.

The model predicts the outcome significantly well as the p-value of 0.014 is less than the level of significance of 0.05 and there is conclusive evidence that the independent variables predict the dependent variable. The next step was to create the Coefficient table which creates information on each predictor value.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.016	.733		2.751	.009
	The Mtubatuba Municipality trains farmers on water conservation methods	.360	.127	.415	2.838	.007
	There has been improvement in water conservation techniques in Ward 19 in the last year	.123	.182	.099	.677	.502

a. Dependent Variable: There has been an improvement in water supply for subsistence farming in the last year in Ward 19

From column B we derive the unstandardised coefficients and create the regression equation, as follows:

There has been an improvement in water supply for subsistence farming in the last year in Ward 19 = 2.016 + (0.360 × **The Mtubatuba Municipality trains farmers on water conservation methods**) + (0.123 × **There has been improvement in water conservation techniques in Ward 19 in the last year**), where the level of significance or p-values derived indicate that there are significant relations with “The Mtubatuba Municipality trains farmers on

water conservation methods" (P = 0.007). (This p value indicates that the coefficient for the variable is not zero and significantly contributes to the model). Thus, this translates to "training of subsistence farmers on water conservation techniques will improve water availability (water supply) for subsistence farming in Ward 19". However, a more refined construct with variables will allow for the development of a more precise model.

5.8 Conclusion

The findings by the researcher arising from the empirical analysis have been contextualised within the broader framework of the study. In the analysis, a number of different statistical methods were used to determine the descriptive and inferential results. The various results were graphically illustrated in tabular and statistical formats. The results have identified significant relationship and differences between the variables by way of hypotheses tested. The analyses and interpretation of data have indicated that insufficient water supply is the main constraint to the development of subsistence farming, which has a direct relationship on standard of living in the area under study. Furthermore, the results obtained from the analyses and interpretation of data has assisted in identifying key challenges within the rural community of Ward 19. Some of these challenges include insufficient rainfall; water conservation techniques used do not result in good crop yield and, there is no alternative water source besides rainfall.

As a result of these challenges, the Ward 19 farming community is willing to employ more advanced water conservation techniques as a means to develop subsistence farming and thereby improving their standard of living. The findings in this chapter are consistent with the literature.

The next chapter deals with recommendations and conclusions that have been derived from the findings. The recommendations and conclusions are also linked to the research objectives and the research problem. The implication for theory and tentative recommendations for practical issues are discussed, and also gives direction for further research.

Chapter 6: Conclusions and recommendations

6.1 Introduction

a. General introduction

The previous chapter presented the findings of the study. This chapter provides an overview of the study with regard to literature; the methodology employed; conclusions; and recommendations. It also highlights recommendations for further studies. Rural development is a topical issue in South Africa. Several studies, policies and strategies as regards rural development are being discussed at various levels and platforms. However, despite the efforts made by government and non-governmental bodies, rural communities such as Ward 19 in Mtubatuba Municipality and many other rural communities still wallow in poverty. The researcher having identified subsistence farming to be the main source of livelihood in Ward 19 has provided a couple of recommendations capable of underpinning subsistence farming with the intent of developing this mode of farming thereby improving the standard of living among dwellers of Ward 19.

b. Research objectives

The aim of this study was to examine the role of water supply in rural agricultural development in the Ward 19 area of Mtubatuba. The objectives of the study were to:

- Evaluate water resource management in Mtubatuba;
- Assess water supply and demand in Ward 19;
- Analyse the effect of water supply on subsistence farming in Ward 19; and
- Make recommendations to improve water resource management in Ward 19.

c. Water conservation techniques from a global perspective

Several water conservation techniques are been adopted by farmers. The methods or techniques utilised are often dependent on the climatic condition, level of technology of a particular farming community, soil type, amount of rainfall and types of crops cultivated (Mulat 2013: 3-5).

An estimated 60 percent of the Israeli total land surface comprises arid and desert land which can barely sustain crop production (Tal and Blaustein 2008: 2). However, despite this unsuitable agricultural terrain, the Israelis are known to be world leaders in agricultural production and research (Tal and Blaustein 2008: 6-8). The Israelis reputation of being world leaders in this field was achieved through several years of research and policy implementation in water resource management ((Tal and Blaustein 2008: 8). South Africa and other water-scarce agricultural nations can also take learns from Israel to accelerate agricultural development and reduce poverty. The achievements and results of this research and innovation have enticed many agriculturally developed nations such as the United States of America, Brazil, Germany, China and Indonesia to learn and adopt the highly sophisticated water conservation techniques invented and developed by the Israelis (Chesla 2013: 2; Novak 2014: 2; WATEC 2013: 3). These sophisticated water conservation techniques have generated employment opportunities; resulted to a tremendous increased output in agricultural production; significantly improved standards of living amongst other various inverse impact it has made on the Israeli agricultural net exportation (Water Technology and Environment Control Exhibition and Conference (WATEC) 2013: 3-8).

However, many underdeveloped and developing nations are unable to adopt these profound initiatives and innovations primarily due to financial constraints, lack of skill and poor

infrastructure (Kanu, Salami and Numasawa 2014: 15; Pitman 2011: 662; Wani *et al.* (2012: 365-369).

Similar to Israel, numerous advancements and much research has also been conducted on water resource management in India (Dey and Sakar 2011; Dabral n.d; Hussain and Giordano 2004; Wilk and Jonsson 2013). The subsistence farmers in India have adopted several techniques in sustaining their crops during drought seasons (Dey and Sakar 2011: 73-78)**.** One of most commonly used techniques by Indian subsistence farmers is referred to as the "percolation tank". Through this technique, subsistence farmers utilise a small reservoir to capture runoff from rainfall, thereby retaining the water for percolation into shallow water tables. The accumulated water is subsequently pumped onto farmlands when required (Wani 2006: 335).

Furthermore, investment in soil fertility in India have resulted in significant improvement in water management. A watershed management experimentation carried out across 300 villages in India found that subsistence farming practices have had an adverse effect on the environment. The study established that subsistence farming practices have depleted the soil micronutrients and macronutrients posing a challenge to the sustainability of crop produce. To revamp subsistence farming amongst these rural farming communities of India, adequate nitrogen and phosphorus were applied. This increased the crop yields for a number of rain-fed crops. In addition, as a result of micronutrient amendment, net economic returns were 1.5–1.75 times higher. Similarly, there were significant improvements when integrated land and water management options were adopted, along with the use of improved cultivars in semiarid regions of India (Jat, Wani and Sahrawat 2012: 201-206). A comprehensive assessment of 311 case studies on watershed programs in India focusing on water resource management found that the mean cost-benefit ratio of watershed programs was relatively high**,** resulting in better standards

of living amongst rural households practicing subsistence farming; creating employment opportunities; augmentation of irrigated area and conservation of soil and water resources (Jat, Wani and Sahrawat 2012: 207-209).

Mati (2007: 1) argues that water conservation management (water resource management) is a critical entry point for tackling rural poverty in Southern Africa. Mati (2007: 2) bases his stance on the fact that the development and growth of several farming communities (in this region) are constrained by the insufficiency of water supply for crops and livestock production. In recognition of this challenge faced by this region, the International Fund for Agricultural Development (IFAD 2012) has included amongst its four principal 'thrusts', actions aimed at "*improving access to and management of land and water"* as one of the key components of undermining poverty; improving food production, as well as enhancing the standard of living in the region. Furthermore, the New Partnership for Africa's Development **(**NEPAD 2009: 19; NEPAD 2011), in its Comprehensive Africa Agriculture Development Programme (CAADP), has recommended a reliable water control system targeted at small-scale water control with the intent of building up soil fertility and moisture holding capacity of agricultural soils and expansion of irrigation as one of three "Pillars" that can make a significant improvement to Africa's agricultural development. In line with this preposition, the management of water under smallholder agriculture was the target of the Millennium Development Goals on hunger and is argued to be an approach to increasing food security and poverty eradication amongst the poor populace of sub-Saharan Africa (Mati 2007: 2).

Sub-Saharan African subsistence farmers like their counterparts in dry Asian farm lands have also been striving to cultivate their crops on degraded farming lands for years (Denison and Wotshela 2009: 20-24). The water conservation techniques utilised by these subsistence farmers are primarily targeted at improving land and water management practices with the intent of reducing erosion; capturing more rainfall; increasing soil organic matter; and replenishing soil nutrients. These strategies have had a significant impact on crop productivity, while reducing agricultural impact on the environment (Mushir and Kedru 2012: 346-348). For instance, subsistence farmers in West African countries (Burkina Faso and Niger) have adopted water conservation techniques locally referred to as *Zai*. The Zai technique is constructed by building stone lines and improving planting pits. The subsistence farmers in this region have been able to trap rainfall on crop fields, thereby increasing average cereal yields from 400 to 900 kilograms per hectare (kg/ha) or more with this water conservation technique (Mati 2007: 42).

Furthermore, subsistence farmers in West Africa have employed integrated soil fertility management by *applying crop residue, compost, mulch, livestock manure, leave, and fertilizer*. These technique(s) have resulted in the development of subsistence farming and improved standards of living in this region as farmers have been able to provide sufficient nutrients to sustain their crops. These techniques enable the restoration of soil organic matter and overall soil fertility, which contributes to sustainable intensification of crop production (Kassam, Friedrich, Shaxson and Pretty 2009). In addition, Kassam *et al.,* (2009) mention that the integrated soil fertility management across more than 200,000 hectares in this region has resulted in crop productivity increases of about 33-58 percent within four years. Furthermore, this set of subsistence farmers also recorded significant crop production, particularly from cassava and cowpea.

Subsistence farmers in Southern Africa (Malawi and Mozambique) have also adopted different water conservation techniques in sustaining their crops. One common technique is the planting of *Faidherbia albida* trees on fields using modest amounts of fertilizer **(**Kassam *et al.,* 2009)**.** As explained by Kassam *et al.* (2009)**,** these planted trees reduce the sun intensity by providing canopies of shade and lock nitrogen in the soil. Through this technique, subsistence farmers in this region have seen their maize production increase from 1 tonne per hectare to 3 and 4 tonne per hectare.

Mati (2007: V) argues that if the water resources of Southern Africa are adequately managed, it will underpin the development in subsistence farming and substantially contribute to rural poverty reduction. Mati (2007: V) further expounds that this region loses major opportunities to increase food security and additional household incomes are being missed due to inefficient management of agricultural water. However, there is substantial evidence within the region which indicates that technologies and approaches for agricultural water management are known and have been practiced in the region. This knowledge is scattered amongst various sources, publications and farming communities around the region (Mati 2007: V).

As highlighted in the aforementioned literature, adequate and efficient utilisation of water resources plays an integral role in subsistence farming.

d. Water conservation techniques used in the area under study

The water conservation technique used by the subsistence farmers in Ward 19 is similar to those used amongst other African subsistence farms and elsewhere. These water conservation techniques are inclusive of the following (Jat, Wani and Sahrawat 2012); Huggins and Reganold 2008; Kassam, Shaxson and Pretty 2009):

- Shift cultivation;
- Rainwater harvesting;
- Planting Without Ploughing (PWP); and
- Mulching.

(Please note, the aforementioned techniques have been explained in chapter 3)

Evidence provided by Mrs Magwaza reveals that when these techniques were used about 10 years back (in Ward 19), it often resulted in good farm yields. However, due to the fast depletion of the soil of the farming community, irregularity of rainfall and invasive alien plants, the same conservation techniques have not resulted in a satisfactory crop yield. Due to the unsustainability of the present water conservation techniques, it is imperative to improvise some plausible techniques in sustaining the variety of crops cultivated in the area under study. Hence, the researcher offers some techniques in the later section of this chapter.

6.2 Conclusions

6.2.1 Main source of livelihood

The study established that above 60 percent of the populace of Ward 19 were involved in subsistence farming. The study further revealed that the subsistence farming projects within Ward 19 had an inverse effect on the participating farmers. These benefits range from food security, employment and social economic impact. It can therefore be inferred that the development of subsistence farming in this community will accelerate rural development and reduce poverty.

6.2.2 Constraints to the development of subsistence farming in Ward 19

The study affirms that there was untapped potential in the agricultural sector of the area under study. One such potential is the large market for vegetables. The study emphasised that water supply is central to the farming activities in this community and has constrained the development of subsistence farming. Therefore, it is quite challenging for the subsistence farmers of this community to benefit and maximise these potentials to the fullest. Besides insufficient water supply, other key factors have posed a threat to the development and growth of subsistence farming in Ward 19, such as climate change, lack of farming tools/ assets, health services and education, farm murders, rural-urban migration and inadequate access to funding for infrastructure.

6.2.3 Proximity of river to farming communities (water demand and supply)

The two main rivers within Mtubatuba Municipality are the Mfolozi and Hluhluwe rivers. However, due to the great distances between the rivers and farming communities, subsistence farmers are unable to access this water to cultivate their farm produce. Also worth mentioning is that the populace of Ward 19 mentioned that water demand far exceeds water supply. Some claimed that the water demand is twice the water supply, while some farmers opined that the water demand is about thrice the available water. Water scarcity reaches its peak during the winter months of May, June and July. These months often record rainfalls as low as 20mm, which can barely sustain any of their farm produce. In addition, the water source (river) in Ward 19 far exceeds the 1,000 metres distance stipulated by the World Health Organisation, as the distances between the rivers and households and farm lands in Ward 19 often range between 2,000 to 5,000 metres.

At the time of this study, no policy on water has been implemented to uplift the current situation of the area under study. Lack of access to sufficient water has tremendously impacted on subsistence farming in Ward 19 and has also exacerbated poverty.

6.2.4 High incidence of poverty in rural areas of KwaZulu-Natal

Among the estimated 10 819 128 million inhabitants of KwaZulu-Natal, an estimated 49.7% of reside in rural areas while the remaining live in urban areas. Many among this rural populace often depend on social grants and their relatives working and living in urban centres. However, this merged income does not suffice their daily needs. This challenge is synonymous with other rural communities of South Africa. KwaZulu-Natal ranks number one amongst the three poorest and most rural communities in South Africa. Moreover, Ward 19 of Mtubatuba Municipality is associated with poor rural infrastructure, service delivery backlogs and few employment opportunities, while a significant percentage of the populace lacks skills and quality education. Furthermore, Ward 19, alongside communities of north-eastern KZN, is amongst the most deprived regions within the province, as well as the one of the poorest communities of South Africa.

6.2.5 Integration between rural development, water resources and agriculture

The study also emphasised the linkage between rural development, water resources and agriculture. The literature highlighted that agriculture thrives in regions with sufficient amounts of water and thus in rural communities characterised with farming. Agriculture plays an expedient role in underpinning rural development in such communities, such as Ward 19 in Mtubatuba Municipality.

A majority of the subsistence farmers in the area of study often cultivate vegetables. This farm produce often requires high quantities of water to attain good yield. This, in additional to reasons, justifies the imperativeness of a steady water supply in this subsistence farming community. Hence, water shortage hinders the growth of subsistence farming and this often results to a lack of development and poverty.

6.2.6 Assessment of water resource management in Mtubatuba

Water is one of the choicest resources available to the Mtubatuba Municipality. The management of this resource is constrained by a lack of skilled personnel. As evidenced by Mr Joseph Gumede (Technical Supervisor, Water and Sanitation, Mtubatuba Municipality), the Water and Sanitation department which manages the limited water resource in Mtubatuba is greatly affected by staff shortages. Staff are not skilled enough to adequately manage this resource. Also, the main sources of water supply, which are the Mfolozi River and ground water, are fast drying up. Furthermore, the mining activities by Tendelecoal Mining (Pty) Ltd in Mtubatuba contaminate the water resource, making it unsuitable for domestic and agricultural uses. The pollution caused by this mining company increases the treatment cost of water, while the accumulated cost of the water treatment is inherited by the customers through the payment of higher tariffs.

South Africa is considered one of the countries with the greatest challenge in relation to alien plant invasion globally. Several species of alien plants are found in Mtubatuba. These plants adversely affect the ecosystem through their excessive consumption of water, light and oxygen. They therefore affect agricultural production. Although the Department of Agriculture in Mtubatuba Municipality has spent millions of rands uprooting this species, much land still needs to be covered.

The lack of routine and preventative maintenance is considered as one of the current challenges affecting the management of water resources in Mtubatuba. Due to financial constraints, small municipalities such as Mtubatuba have no preventive maintenance scheme. The lack of routine maintenance can have a grievous effect on the infrastructure, which often results in a higher cost of maintenance. However, when a major fault is detected, the municipality is compelled to conduct maintenance.

It can be deduced from the aforementioned issues that water resource management needs to be underpinned in order to manage and judiciously utilise the available water resource adequately. A sustainable water management approach is therefore a process element of sustainable human development and can address poverty and proffer a better standard of living, while poor management of water resources could result in poverty stricken conditions for individuals, particularly amongst rural subsistence farmers who farm in water scarce regions.

6.2.7 Disconnection from reality

The nature of projects executed by the local municipality sometimes does not conform to the most desired needs of the populace of that community. One such project is the Ophondweni multipurpose community hall recently constructed in the area under study. This multi-million rand project is barely used as the community members seldom hold functions in this facility. Large funds are also spent on beautification projects. The funds invested in these projects could have been channelled to projects which will have an impact on standards of living and poverty eradication in this community. It can be argued that some of these projects do not have a direct impact on poverty eradication or agricultural development, which is the main source of livelihood in this community.

6.2.8 Predominance of women in area under study

The study revealed that womenfolk are predominant in Ward 19. This situation can be found in many communities across Mtubatuba Municipality. In recognition of this dominance, empowering women can be a stepping stone to accelerating rural development in the community. Empirical studies also reveal that women are often the breadwinners in several households across rural South Africa (Rust 2007: 12-14; Statistics South Africa 2011: 48). The greatest challenge and opportunity in rural development comes from the empowerment of women (Falkenmark 2013: 394-395). Empowerment of women could come in the form of seeking their opinions as regards water conservation techniques, as well as providing on- the-go training on water resource management.

6.2.9 Superstitious belief versus water scarcity

A majority of the subsistence farmers in the area under study believe that their gods and ancestors are responsible for rainfall and drought. When the community experiences water scarcity, they often attribute this to anger from their deities. They believe this is a form of punishment for their misdeeds. In the opinion of some other community members, they believe that when drought occurs they are being punished for the degeneration of values in their community.

To appease the gods, they often make sacrifices to remedy the situation. To correct this misconception among this subsistence farming community, it is recommended that the assigned agricultural extension worker allotted to each farming community educates and create more awareness and enlightenment around this issue. Precautions should also be taken to safeguard the innocent community member who they often believe is the cause of this water scarcity spell.

6.3 Recommendations

6.3.1 Affirmative and comprehensive policies

The ecological condition of water resources can either underpin or undermine agriculture and fishery (National Research Institute of Science and Technology for Environment and Agriculture 2012: 1). In recognition of this, it is imperative for policy makers to make affirmative policies that could underpin the development of water resource management in rural communities, as well as South Africa as a whole. The establishment and development of policies on water resource management is considered to be one of the key factors which led to the development of agricultural and economic development in a water-scarce country like Israel. The Israeli government, alongside researchers, developed affirmative policies to accelerate the development of agriculture and many developed countries are currently learning from Israel (Tal and Blaustein 2008: 5-8).

Furthermore, at the grassroots level, local municipalities have to play a leading role in achieving an integrated water resource management system by creating awareness and educating their community members, more particularly farmers. Contextualising policy usage to the area under study will imply that, while the policy makers (Councillors, Mayor, Department of Agriculture and Department of Rural development) are implementing these decisions, it will be needful to include the subsistence farmers in this community in order to ensure sustainability of such decisions and also to obtain occasional feedback. Achieving a successful and affirmative policy on water resource management will involve different sectors, departments and stakeholders working in the same direction. It will also require experts in water management, engineers, policy makers and end-users. Experts with an in-depth knowledge of water management are also required to enact sustainable policies which will be beneficial in the short and long runs (Bacus 2013: 13-14). Due to the shortage of experts in water management, more people need to be

trained to fill the gap (DWA 2012: 18). Continuous awareness is required to sensitise the populace on water resource management as this will result in effective policy implementation and sustainability. In conclusion, policies on water resource management should be included in the subsequent Integrated Development Plan (IDP).

6.3.2 Training in water conservation techniques

The study revealed that training in water conservation techniques amongst the subsistence farmers of Ward 19 in Mtubatuba Municipality is essential. The agricultural extension workers who act as mentors to the subsistence farmers also require regular training on water conservation techniques. Due to the fast pace of soil depletion and insufficiency of water resources in the area under study, affirmative techniques are required in this farming community to sustain subsistence farming. Several studies have justified the significance of training of subsistence farmers on water conservation techniques. One such study is by Mulat (2013) in Ethopia, who maintained that training farmers on water conservation techniques has led to a significant positive difference in crop yield. Similar studies conducted by Dabral (n.d) amongst some farming communities in the north-eastern region of India revealed that training of farmers on water conservation techniques does not only sustain the ecosystem, but also has led to sustainability of subsistence farming in the Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura farming communities.

6.3.3 Institutional partnership with local municipalities

The Durban University of Technology, being an institute of higher learning, has been dedicated to research for a couple of years (DUT Research Report 2012). In taking a step further, the institute can partner with local municipalities by assigning research students to specific local

municipalities with the intent of identifying potentials and challenges in these communities. This form of academic partnership can possibly result in the exchange of profound ideas; plausible recommendations capable of underpinning rural development; and reducing poverty in these rural municipalities. This can also foster relationships between the Durban University of Technology and the (selected) local municipalities.

6.3.4 Women empowerment and skill acquisition

As mentioned earlier in this study, womenfolk are found to be the dominant gender in the area under study. Empowering women of this community through vocational training, skill development programmes and their involvement in decision making can possibly have positive effect in the short-and long-run developmental plan of this community. Several studies have stressed the importance of women empowerment, particularly in rural communities (Falkenmark 2013: 394; United Nation Development Programme 2012: 2). Studies by Kanu, Salami and Numasawa (2014: 48-54) emphasised that women empowerment in rural communities have a direct linkage with rural development. He further mentions that when women are empowered, it often results in high self-esteem, independence and the zeal to contribute more to their immediate community, thereby enhancing rural development.

6.3.5 Underpinning rural development through subsistence farming in Ward 19

When rating the overall standard of living, health, poverty and other economic indicators such as inflation and unemployment, the rural communities of South Africa are also taken into consideration. In addition, a substantial amount of minerals, energy, biodiversity, natural and cultural experiences, land and labour come from the rural areas. Some of these resources become scarcer with the passage of time. It will be important to maximise their usage (South African

National Development Plan 2011: 239). In recognition of this statement, the development and growth of rural communities in KZN needs to be given more attention.

Furthermore, empirical studies have revealed that countries who focus on tackling rural poverty as opposed to urban poverty have been able to decrease the poverty rate faster than countries who focus more on urban poverty. More so, the South African manufacturing sector is heavily dependent on agricultural produce, implying that if the rural setting where many of the farming activities takes place is not developed, it will have a negative consequence for the manufacturing sector of the country, as well as its economy. Developing the rural areas through activities like farming will generate more job opportunities, thereby alleviating poverty.

The study also revealed that 42.1% of the youth of KZN are unemployed. Some researchers (Averbeke 2008, Bhatti, Koike and Nasu 2012) have come to the conclusion that if agriculture is well harnessed, it has the potential to generate a considerable number of jobs in KZN within the short-term. In the medium-term, the sector can support labour-intensive farming activities to create more job opportunities. The implication therefore is that the government will direct it efforts towards labour-intensive means of job creation as opposed to mechanised farming. If this is achieved, it will be a positive step towards addressing the poverty in rural KZN. In spite of the above, subsistence farming currently faces several constraints which have an adverse effect on poverty (Commission of Inquiry into Provincial Growth and Development 2013: 18). The importance of subsistence farming cannot be overemphasised in Ward 19, as it is the main source of livelihood for this community. This literally means that the development of subsistence farming in this region will translate into a better standard of living, thereby reducing poverty.

6.3.6 Water resource management as an imperative for rural development and subsistence farming

The South African government, both at provincial and municipality level, have enacted several policies and strategies to accelerate development in rural communities, as well as sustain subsistence farming. However, these policies and strategies have not yield the desired results.

There is a direct linkage between water resource management, subsistence farming and rural development (Kanu, Salami and Numasawa 2014: 33-43). The efficient and effective use of every drop of water in the sustainability of crop production has a positive effect on subsistence farming which enhances rural development (Taigbenu, Ncube and Boroto 2010: 7; Pennisi 2008:171-173).

For this reason, it is argued that water resource management can underpin the acceleration of growth in rural communities and also result into the development of subsistence farming (Wilk and Jonsson 2013: 696; Bhatti, Koike and Nasu 2012: 5-6).

According to Molden *et al.*, (2007: 21), the world's available land and water resources can satisfy future demands if the following steps are taken:

1. Upgrading rain-fed agriculture by investing more in rain-fed agriculture to enhance agricultural productivity (rain fed scenario);
2. Discarding the artificial divide between rain fed and irrigated agriculture and adopting integrated water resource management approaches for enhancing resource efficiency and agricultural productivity;
3. Investing in irrigation for expanding irrigation where scope exists and improving efficiency of the existing irrigation systems (irrigation scenario);

4. Recycling wastewater (grey water) for fodder and food production after suitable treatment;
5. Conducting agricultural trade within and between countries (trade scenario); and
6. Reducing gross food demand by influencing diets and reducing postharvest losses, including industrial and household waste.

In conclusion, several studies have justified the importance of water resource management in sustaining subsistence farming in water scarce communities across South Africa and Africa as a whole. Such management is essential in the area under study in order to enhance subsistence farming, thereby developing rural agriculture through water and reducing poverty.

6.4 Recommended water conservation techniques for area under study

Studies on climate change identify subsistence farmers of the Southern African region as one of the most affected groups of farmers (Findlater 2013; Falkenmark 2013; Wani, Garg, Singh and Rockstorm 2013). They substantiate their argument with the fact that the level of depletion in this region is deteriorating at a faster rate as compared to other regions of the globe. In consonance to this preposition, elaborate water conservation techniques are required to sustain crops in these regions. However, before such recommendations are given, three key factors need to be considered. These include rainfall pattern, soil type and cultivated crops.

After a series of consultations with agriculturists and farm extension workers; subsistence farmers in Ward 19; collation of participants' responses and studying of various literature on water conservation techniques, the researcher proposes three water conservation techniques capable of sustaining the variety of crops cultivated in Ward 19.

However, the factors considered before proposing these water conservation techniques are:

- Sustainability;
- Affordability;
- Topography; and
- Soil type.

With regard to sustainability, the recommended strategy is capable of sustaining crops during the rainy periods as well as drought periods. Furthermore, sustainability in this context also implies that the subsistence farmers of this locality are able to continue using these techniques over a long period of time.

Affordability means an affordable water conservation technique as opposed to expensive techniques used in Israel and other agriculturally advanced countries.

Factoring topography into the recommended technique is due to the steep topography of Ward 19. This factor is imperative as there are often high water losses during rainfall because the soil is unable to absorb the rainfall. Thus, the amount of rainfall is not being maximised.

Lastly, the soil type has been considered as the level of fertility and soil type often determines the crop yield (Denison and Wotshela 2009: 5-7).

Water conservation techniques (WCTs) proposed in this study are elaborated below:

6.4.1 Water Conservation Technique 1

- **Name**

  Drum drip kits (Bucket drip kits)

- **Description**

  This technique is often used to supply water either on the soil surface or directly to the roots of the cultivated crops through systems of plastic tubing with small holes and other

restraining outlets. The water drips are connected in such a manner that it enables the filtration of impurities that may block the drip nozzles. The tank is supported by a stand which could be one meter above the ground surface. This drum requires a minimum of 50 litres of water on a daily basis to irrigate about 150 crops. This technique has been used by many subsistence farming communities of Southern Africa to optimise yields per unit volume of water and land (Mati 2007: 8).

- **Practicality**

  To construct this water conservation technique, a borehole will be made to draw water from the available ground water within the farm land. This borehole will be connected to a 500 litres storage tank such as the one depicted in Figure 5.1. The water will then be circulated through tiny pipes to feed the crop roots. However, it is recommended that the pipes are buried underneath the soil and demarcated in order to prevent damage to the pipes.

- **Illustrations**

  Figure 6.1: Illustration of a drum kit (1)

Source: Adapted from McDonald (2013: 2)

Figure 6.2: Illustration of a drum kit (2)

Photo credit: rexresearch.com/

Source: Adapted from McDonald 2013: 2

- **Countries where the Drum drip kits have been used**- Lesotho, Kenya, Tanzania, Zambia, and Zimbabwe

- **Justification** (evidence that it will work)
  It is believed that this technique will be able to sustain crop production in the area under study as it has resulted in reasonable crop yields in farming regions such as Lesotho and Zimbabwe which share similar climate, soil type and rainfall patterns. Furthermore, this technique has been able to sustain high-value vegetables such as tomatoes, cabbage and spinach in drought seasons (Mati 2007: 8) which are often cultivated by the subsistence farmers of Ward 19.

6.4.2 Water conservation technique 2

- **Name**

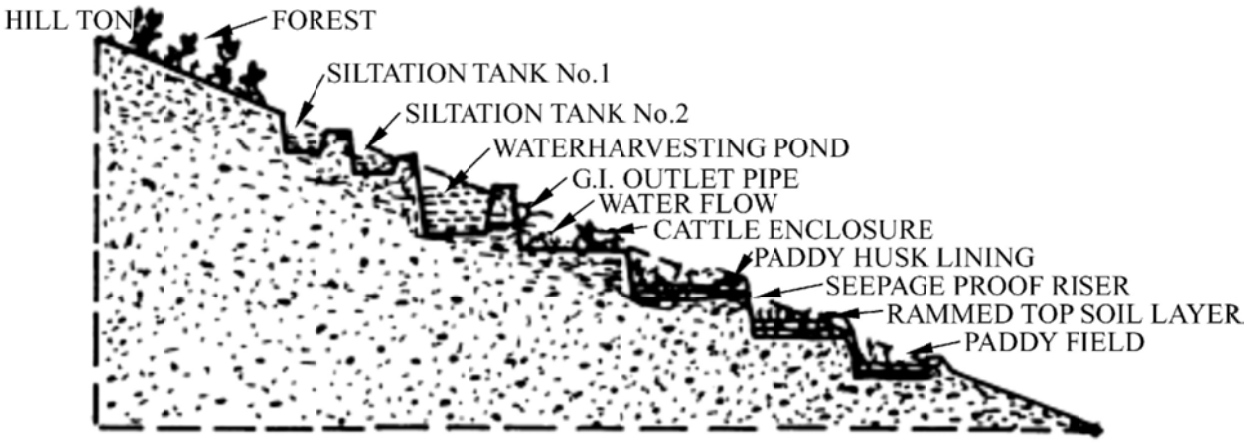
The Zabo system of farming

- **Description**

"Zabo" is an indigenous farming system often used in the north-eastern region of India. The word "Zabo" *means impounding of water*. The Zabo is planned in such a manner that a protected forest land area is taken as the first phase. This first phase is often situated at the top of the hill. Water harvesting tanks are constructed in the second phase. Space for rearing cattle and livestock are contained in the third phase. The lowest surface where crops are cultivated is the fourth phase. This construction of the Zabo is carefully made in such a manner that it allows the flow of water resource and animal dung from the first, second and third phases to the fourth phase where plants are being cultivated. Water resource management and protection of the ecosystem are inherent features of the Zabo farming systsem (Sharma *et al*., 1994 cited by Dabral n.d 93).

- **Practicality**
  This technique is suitable to the area under study as this community is characterised with varying topography. It is recommended that the subsistence farmers in this community make construction similar to that depicted in Figure 6.3. Construction is made in such a way that the upper region allows the accumulation of water, while the next platform (region) is constructed in such a way that it will enable cattle and livestock breeding. As earlier cited in the study, the community members also rear cattle and livestock. Hence, the accumulated rainfall will wash the animal dungs and faeces to the platform (region) where the crops are being cultivated. The animal dungs and faeces will serve as manure which will provide nutrients to soil, which in turn results in better crop yield.
- **Illustration**

Figure 6.3: Concept of land management in the Zabo farming system



Source: Adapted from Dabral (n.d. 94)

- **Countries where the Zabo system has been used**
  India, Ethopia and Kenya

- **Justification (evidence that it will work)**
  It is believed that this water conservation technique will result in good crop yield for the reasons listed below:

- Due to the nature of the steep topography of some of the farm lands in Ward 19, it will allow the gathering and accumulation of rain water to flow from high surface areas to low surface areas where the crops are cultivated. Hence, it allows percolation of water to crop roots.
- The soil type in Ward 19 is quite resistant to erosion. This will enable water flow while having limited impact on the ecology of the farming area.
- As illustrated in Figure 6.3, cattle and livestock will be reared on the higher surfaces. The dung and faeces from these animals when washed down to the lower surfaces will serve as fertiliser, which will improve crop yield.

6.5 Recommendation for further study

The research presents a diverse array of opportunities for further studies. While this study focused on water conservation techniques for subsistence farming in the area under study as a strategy for underpinning rural development and reducing poverty in rural South Africa. Further studies can be conducted on soil conservation techniques as the soil type plays an integral role in crop yield (Moeletsi and Walker 2011: 426-427). Such study on soil conservation techniques also has the potential of accelerating the development and growth of subsistence farming, thereby improving the standard of living of the rural community engaged in subsistence farming (Denison and Wotshela 2009: 19).

This research was confined to a subsistence farming community. Further studies need to have a wider scope in geographic terms. Further investigations can be conducted amongst different rural subsistence farming communities across South Africa (within the context of field of the study). This will allow a contrast and comparison of strategies utilised by various subsistence farming communities in accelerating rural development in the country to be made. Thus, such studies may provide valuable and comparable insights into rural development and poverty eradication as key components for strategic decision making in the Integrated Development Plan (IDP) for rural municipalities. In addition, a longitudinal study is recommended on an annual basis in the area under study to evaluate the outcome of recommendations made.

6.6 Conclusion

The subsistence farming community of Ward 19 in Mtubatuba Municipality situated in the north-eastern region of KwaZulu-Natal Province, has long been enslaved by a cycle of poverty. This community remains stagnant in terms of service delivery, provision of basic services,

employment opportunities, education, social amenities, housing, as well as infrastructural development although this community is privileged to have vast farmlands populated with individuals who are willing to engage in farming, water shortage has posed a hindrance to the development and growth of subsistence farming in this community. To address this challenge, it is imperative to take some affirmative and progressive steps to underpin subsistence farming, thereby improving the standard of living and curbing poverty to a reasonable extent. One of the suggested affirmative and progressive steps lies in water resource management, as a well-tailored and effective water resource management approach will transform the defunct subsistence farming into commercial farming which will increase crop production, create job opportunities, generate additional income for subsistence farmers, improve standards of living and accelerate the pace of rural development.

Furthermore, revamping the defunct subsistence farming in Ward 19 as well as improving the standard of living requires a purposeful co-ordination and exchange of ideas between researchers in the field of study, policy makers and stakeholders. Such purposeful co-ordination should have an agenda of transforming subsistence farming into a sustainable form of farming, whereby many of the rural populace will be encouraged to partake as a means of livelihood. The resultant effect will be an increase in household income and food security, thereby reducing poverty.

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APPENDIX A

QUESTIONNAIRE

(Questionnaire for farmers in Ward 19)

UHLA LWEMIBUZO

(Uhla lwemibuzo ezonikezwa abalimi base eWadi ye-19)

Questionnaire for quantitative data collection

Dear respondent, please select the option that best expresses your opinion.

Uhla lwemibuzo lokuqoqwa kolwazi ngokwenani

Mphenduli, uyacelwa ukuba ukhethe lokho okuchaza kabanzi umbono wakho.

Section A: Water resource management

Isigaba- A: Ukulondolozwa kwamanzi

a. What water conservation technique do you use?

1	Rainwater harvesting	
2	Pumping water from the river	
3	Watershed management	
4	Soil and water conservation	
5	Soil fertility (manures, fertilizers, residues)	
6	Drainage (of wetlands, temporary waterlogged soils etc)	
7	Others (please specify)	

b. The Mtubatuba Municipality trains farmers on water conservation methods?

1	Strongly agree	
2	Agree	
3	Indifferent	
4	Disagree	
5	Strongly disagree	

b. UMasipala waseMtubatuba uqeqesha abalimi ngezindlela zokulondolozwa kwamanzi?

1	Vuma kakhulu	
2	Vuma	
3	Phakathi nendawo	
4	Phika	
5	Phika kakhulu	

c. Water shortage is experienced often?

1	Strongly agree	
2	Agree	
3	Indifferent	
4	Disagree	
5	Strongly disagree	

c. Kuvamise kangakanani ukuswelakala kwamanzi?

1	Vuma kakhulu	
2	Vuma	
3	Phakathi nendawo	
4	Phika	
5	Phika kakhulu	

d. There has been improvement in water conservation techniques in Ward 19 in the last year?

1	Strongly agree	
2	Agree	
3	Indifferent	
4	Disagree	
5	Strongly disagree	

d. Sekube nokuthuthuka ngezindlela zokulondolozwa kwamanzi eGunjaneni onyakeni odlule?

1	Vuma kakhulu	
2	Vuma	
3	Phakathi nendawo	
4	Phika	
5	Phika kakhulu	

e. What water source(s) do you use for cultivating your crops?

1	Rain fall	
2	Dam	
3	Borehole	
4	River	
5	Others (specify)	

_____

e. Nisebanzisa miphi imithombo yamanzi ukuchelela izitshalo?
_____

1	Rain fall	
2	Dam	
3	Borehole	
4	River	
5	Others (specify)	

f. Are you billed for water usage?

_____

Section B: Water supply and demand

Isigaba- B: Ukuhlinzekwa nokudingeka kwamanzi

a. What farming activities do you use water for?

_____

a. Yimiphi imisebenzi oyisebenzisela amanzi?

_____

b. Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?

_____

b. Nikeza inani okucatshangelwa kulo lamanzi asetshenziswa nsuku zonke ukwenza imisebenzi yezolimo (ngamakhilolitha)?

_____

c. What causes water shortage?

1	Little rainfall	
2	Interruption in supply	
3	Drying of water source	
4	Others (specify)	

_____

d. Where do you obtain water during water shortage?

_____

Niwathola kuphi amanzi ngezikhathi zokushoda kwawo?

_____

e. Does the Municipal supply water for agricultural purposes?

_____

Ngabe uMasipala uyawahlinzeka amanzi okulima?

_____

f. If Yes to the above question, is the water supply sufficient for crop production?
_____

Uma impendulo kuwuyebo, ngabe lawo manzi eniwanikwayo anele yini?

_____

g. Is the same water source for consumption used for agricultural purposes?
_____

Section C: Effect of water supply on subsistence farming

Isigaba- C: Umthelela wokuhlinzekwa kwamanzi kubalimi abazimele

a. Insufficient water supply is the main constraint to development of subsistence farming in Ward 19?

1	Strongly agree	
2	Agree	
3	Indifferent	
4	Disagree	
5	Strongly disagree	

a. Ukushoda kokuhlinzekwa kwamanzi yiyona ngqinamba ekuthuthukiseni abalimi abazimele eWadini ye-19?

1	Vuma kakhulu	
2	Vuma	
3	Phakathi nendawo	
4	Phika	
5	Phika kakhulu	

b. There has been an improvement in water supply for subsistent farming in the last year in Ward 19?

1	Strongly agree	
2	Agree	
3	Indifferent	
4	Disagree	
5	Strongly disagree	

b. Kube nokuthuthuka ekuhlinzekweni kwamanzi kubalimi abazimele kulo nyaka owodwa odlule eWadini ye-19?

1	Vuma kakhulu	
2	Vuma	
3	Phakathi nendawo	
4	Phika	
5	Phika kakhulu	

c. Which crops do you cultivate?

1	Maize	
2	Sugar cane	
3	Beans	
4	Tomato	
5	Others (Please specify)	

d. Which of your crop produces requires the most water supplies?
_____

Isiphi ezitshalweni zenu esidinga amanzi amaningi?

1	Maize	
2	Sugar cane	
3	Beans	
4	Tomato	
5	Others (Please specify)	

Section D: Recommendations

Isigaba- D: Izincomo

a. What recommendations can you give to improve water conservation for subsistence farming in Ward 19?

_____

a. Iziphi izncomo ongazenza ukuthuthukisa amaqhinga okonga amanzi okuzilimela eWadi ye-19?

_____

b. What recommendations can you give to sustain crops during water shortage?

_____

b. Yiziphi izincomo ongazinikeza ukuthuthukisa izinga lokulondolozwa kwamanzi eWad ye-19?

_____

Section E: General comments

Isigaba- E: Ukuphawula okujwayelekile

a. What changes will you want the water authority to make as regards to water supply for subsistence farming?

_____

a. Iziphi izinguquko ozofuna ukuthi uhulumeni azenze mayelana nokuhlinzekwa kwamanzi okuzilimela?

_____

b. What are the main factors affecting the growth and development of subsistence farming in Ward 19?

b. Iziphi izinto ezinomthelela kakhulu ekukhuleni nasekuthuthukeni kokuzilimela eWadi ye-19?

_____

Thank you for your assistance.

Siyabonga ngosizo lwakho.

APPENDIX B

SN	Organisation	Name	Position	Relevance for study
A1	**Department of Water Affairs, Durban**	Michael Singh	Water conservation manager	Mr. Singh is a water conservation expert, and he was able to proffer some valuable information on water resources management.
2		Sizwe Madlala	Deputy Director, Water Sector Regulation	Mr. S. Madlala is among the senior officials of DWA. He specialises in regulation of water and water revenue.
3		Ntuthuko Khoza	Water Service Director	He promotes the co-ordination of the implementation of water services development.
B4	**Department of Agriculture, Environmental Affairs and Rural Development**	Velaphi Myeza	Extension officer	He's the project coordinator of the Hlalaneni landscape farm project. He has been able to provide insight into how the project is managed.
5		Mrs Bridget Mncwango	Local Director	She is the manager of the above mentioned department, and she has useful information on the

				agricultural sector of Mtubatuba Municipality.	
C6	**Mtubatuba Municipality**	Zinkle Thwala	Town planner	She is tasked with planning and maximising land usage in Mtubatuba. She works with Councillors, the Induna's and the people of Ward 19. She was able to explain with a detailed map on the future plans of the Mtubatuba Municipality , and how the Municipality intends to reduce poverty.	
7		Andile Biyela	LED Officer	Mr. Biyela's responsibilities are identifying and using primary local resources, ideas and skills in an integrated way to stimulate economic growth and development in the locality.	
8		Phiwayinkosi Mlungwana	Social facilitator	He is involved with rural projects in Mtubatuba	
D9	**Umkanyankude (Water supplier for Mtubatuba Municipality)**	Mr. Msweli	Supervisor of Gunjaneni area	Mr. Msweli ensures the supply of water (for domestic purposes) during the dry seasons to residents of Ward 19. He was interviewed as he has valuable information such as the estimated amount of demand of water in Ward 19 as well as its supply.	
10		Mr. Njabulo Mthiyane	Director of Umkanyakude	He supervises and monitors water supply in Mtubatuba Municipality.	
11		Mr Joseph Gumede	Technical supervisor	He plays a supervisory role in the maintenance of water infrastructures in Mtubatuba.	
E1 1	**Ward 19**	Mr. C.V Mkhwanazi	Councillor to Ward 19	The Councillor has the sole responsibility of Ward 19's development and growth. While been interviewed, he gave basic facts about the case study area, which could not be found in books or elsewhere.	
12		Mrs. Sibongile Magwaza	Initiator of Hlaneni Landscape farm project	Being the initiator of the project, valuable information on how the project commenced, challenges and potentials were inquired.	

APPENDIX C

Structured interview for 3 senior members of the DWA, and below are names of individuals interviewed:

A. Department of Water Affairs, Durban

1. Michael Singh (Water conservation manager)

2. Sizwe Madlala (Deputy Director, Water Sector Regulation)

3. Ntuthuko Khoza (Water Service Director)

Section A: Water resources management

1. How would you rate water resources management in rural areas of KwaZulu- Natal??

1	Very poor	
2	Poor	
3	Average	
4	Good	
5	Excellent	

_____

2. How can water resources management be improved in water scarce farming areas of KwaZulu-Natal?
_____

3. What effect does a good water resource management have on subsistence farming?
_____

4. What are the consequences of poor water resources management on subsistence farming?
_____

Section B: **Water supply and demand**

1. What role has the DWA played in bridging the gap between water supply and demand in rural KwaZulu- Natal?

   _____

2. What challenges does the DWA have as regards to supplying rural KwaZulu-Natal with water?

   _____

3. Is the water been supplied sufficient for domestic purposes in rural KwaZulu-Natal?

   _____

4. What future plan does the DWA have for expansion of water supplies in rural KwaZulu-Natal?

   _____

Section C: Subsistence farming and water finance

1. Are all water users registered?

   _____

2. If no to question 1, what plans are been made to register them?

   _____

3. Are residents of rural KwaZulu- Natal charged for water usage?

   _____

4. What schemes have been provided by the DWA to support subsistence farmers in rural KwaZulu- Natal?

   _____

5. Does the DWA organise training for subsistence farmers?

   _____

Section D: Recommendation

1. What recommendation will you offer rural farmers during water shortage?
   _____

2. What recommendations will you give to improve water resources management in rural KwaZulu- Natal?
   _____

3. How can water supply be improved in rural KwaZulu-Natal?
   _____

APPENDIX D

Structured interview for 3 Mtubatuba Municipality staff members, and below are names of individuals interviewed:

Mtubatuba Municipality

1. Zinkle Thwala (Town planner)

2. Andile Biyela (LED Officer)

3. Phiwayinkosi Mlungwana (Social facilitator, Mtubatuba Municipality)

Section A: Water supply and demand

1. What role has your office played in reducing water shortage in Ward 19?
   _____

2. Does Ward 19 have required infrastructure for water supply?
   _____

3. If no, what plans are been made?
   _____

4. What improvements have been made in terms of water supply in Ward 19 in the last year?
   _____

5. Are there alternative water sources during water scarcity for agricultural purposes?
   _____

Section B: Water resources management

1. How will you evaluate the water resources management in Mtubatuba?
   _____

2. What role has the Mtubatuba Municipality played in improving water resources management?
   _____

Section C: Role of the Mtubatuba Municipality

1. What support has your office given to subsistence farmers in Ward 19?
   _____

2. Does your office organise training for farmers?
   _____

3. Does the Mtubatuba Municipal supply water to Ward 19 for domestic purposes?
   _____

Section D: Recommendation

1. What role can the Mtubatuba Municipality play in supporting the farm projects in Ward 19?
   _____

2. Please explain how farmers in Ward 19 could sustain their crops during water scarcity?
   _____

3. How can subsistence farming be improved in Ward 19?
   _____

4. What role can the Mtubatuba Municipality play in improving water supply for agricultural purposes in Ward 19?
   _____

APPENDIX E

Structured interview for 2 of the staff members of the Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development, and below are names of individuals interviewed:

Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development (Mtubatuba Municipality)

1. Velaphi Myeza (Extension officer to Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development, Mtubatuba).

2. Mrs Bridget Mncwango (Local Director for the Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development, Mtubatuba.

Section A- Water Source, demand and supply

1. Where does the farm project source its water?
   _____
2. How frequent does the project experience water shortage?
   _____
3. Is water supply adequate for crop production on this farm project?
   _____
4. Are there future plans for alternative water supplies during acute water shortage for farming purposes?
   _____
5. What plans are been made to bridge the gap between water demand and supply?
   _____

6. What impact does water supply have on crop yield? _____
7. What impact does water shortage have on the project? Please explain in details? _____

Section B- Hlaneni landscape project

1. Is the water resource management practice good on the farm project? _____

2. If the water resources management is poor, how can it be improved? _____

3. Please explain the role that you as an extension officer play in the development of water resources management strategy? _____

4. Who are the other stakeholders to this project? The role they play? _____

Section C- Role of Department of Water Affairs, the Department of Agriculture, Environmental Affairs and Rural Development

1. Does your department train farmers on water conservation techniques? _____

2. What role has your department played in improving water resources management in Ward 19? _____

Section D- Recommendations

5. How can water resources management be improved on the farm project? _____

6. What other roles can the Department of Agriculture play to sustain the farm project?
   _____
7. Please explain how farmers in Ward 19 could sustain their crops during water scarcity?
   _____
8. How can subsistence farming be improved in Ward 19?
   _____
9. How can farmers in Ward 19 improve their crop yield?
   _____
10. What major challenges does this farm project face, and how can they be resolved?
    _____
11. What future plan does the Department of Agriculture have for subsistence farming?
    _____
12. What role can the Department of Water Affairs play in improving water supply for agricultural purposes?
    _____

APPENDIX F

Structured interview for Umkanyakude senior officials, and below are names of individuals interviewed:

Umkanyankude (Water supplier for Mtubatuba Municipality)

1. Mr. Msweli (Supervisor of Ward 19)
2. Mr. Njabulo Mthiyane (Director)
3. Mr Joseph Gumede (Technical supervisor)

Section A- Water source

1. What are the sources of water supply in Ward 19 of Mtubatuba Municipality?
   _____
2. Are there alternative sources during water scarcity?
   _____

3. What is the estimated distance in Kilometres between water sources and residents of Ward 19?
   _____

4. Are there plans for new water supply sources?
   _____

Section B- Water supply

1. What is the estimated amount of water supplied to Mtubatuba?
   _____

2. What is the estimated amount of water supplied to Ward 19?
   _____

3. Is the water supply adequate for domestic usage in Ward 19?
   _____

4. Is water supplied to farmers in Ward 19?
   _____

5. How is water been supplied to Ward 19?
   _____

Section C- Water demand

1. What is the estimated amount of water demanded in Mtubatuba?
   _____

2. What is the estimated amount of water demanded in Ward 19?
   _____

3. How frequent do residents of Mtubatuba experience water shortage?
   _____
4. What sector in Mtubatuba has the highest demand for water?
   _____
5. Is water demanded by residents been met?
   _____
6. Is water demanded by subsistence farmers been met?
   _____

Section D- Water finance

1. Are residents billed for water supply?
   _____
2. Are there unregistered water users?
   _____
3. What role has your department played in registering water users?
   _____
4. How is your department been financed?
   _____

Section E- Role of Umkanyankude

1. Does your department train farmers of Ward 19 on water conservative techniques?
   _____
2. Does your department support subsistence farmers?
   _____
3. What kind of support is provided?
   _____

Section F- Challenges

1. What are the challenges of your department as regards to water supply?
   _____
2. What challenges does your department face as regards to water demand?
   _____

Section G- Recommendations

1. How can your department improve water supply for domestic purposes to Ward 19?
   _____
2. How can your department improve water supply for agricultural purposes in Ward 19?
   _____
3. What recommendations will you give farmers to improve water conservative techniques?
   _____
4. What role has your department played to bridge the gap between water supply and demand in Ward 19 and Mtubatuba Municipality as a whole?
   _____
5. What is your departments' future plan to curb water shortage?

APPENDIX G

Structured interview for Ward 19 representatives, and below are names of individuals interviewed:

E. **Ward 19**

1. Mr. C.V Mkhwanazi (Counsellor to Ward 19)
2. Mr. M Mdletshe (The Induna to Ward 19, traditional leader)
3. Mrs. Sibongile Magwaza (Initiator of Hlaneni Landscape farm project)

1. **Mr. C.V Mkhwanazi (Counsellor to Ward 19)**

Section A- Water supply and demand

1. What are the sources of water supply in Ward 19?
   _____
2. What interventions occurred to improve water supply in Ward 19?
   _____
3. Has there been any improvement in the last year in water supply?
   _____
4. What improvement in water supply occurred in the last year?
   _____
5. What are the major challenges of water supply to Ward 19?
   _____
6. What future plans are there to improve water supply in Ward 19?
   _____
7. What is the estimated demand of water in Ward 19 (in kilolitres)?
   _____
8. What is the estimated supply of water in Ward 19 (in kilolitres)?
   _____

Section B- Subsistence farming

1. What are the challenges facing the development of subsistence farming in Ward 19?
   _____
2. Are farmers trained on how to improve their crop yields by effective water use?
   _____

3. If yes, what type of training is it? And how effective has it been?
   _____

Section C- Recommendations

1. What role can the government play to improve water supply for subsistence farming?
   _____

2. What recommendations can you give farmers in Ward 19 during water shortages?
   _____

2. Mr. M Mdletshe and Mrs. Sibongile Magwaza

Section A- Water supply and demand

Isigaba A- Ukuhlinzekwa nokudingeka kwamanzi

1. What are the sources of water in Ward 19?
   Tholakala kuziphi nindawo amanzi eWadi ye-19?

   _____

2. Does the Mtubatuba Municipality supply Ward 19 with potable water for domestic purposes?
   Ingabe umasipala wase Mtubatuba uyawaletha amanzi anele ku eWadi ye-19 okwenza umsebenzi wasekhaya?

   _____

3. If yes to the question 2, is the water adequate for domestic purposes?
   Uma kunjalo, ingabe anele na?

   _____

4. How frequent is water shortage in Ward 19?
   Ngabe kuvamise kangakanani ukuswelakala kwamanzi endaweni yase eWadi ye-19?

   _____

Section B- Subsistence farming

Isigaba B – Ukutshalwa Kwasemakhaya

1. How has subsistence farming supported the lives of people of Ward 19?
   Kunjani ukugcina ukutshala kugqugquzela impilo zabantu njenge Iwadi yesi-19?

   _____

2. What improvement have you noticed in subsistence farming in the last year?
   Iziphi izinguquko usuzibonile kwi Ukutshalwa Kwasemakhaya ukutshala ngonyaka odlule?

   _____

3. What factors are constraining the development of subsistence farming in Ward 19?
   Yiziphi izimo ezinqanda ukuthuthukiswa kokulimela ukuziphilisa eWadi ye-19?

   _____

4. Does the Department of Agriculture in Mtubatuba train farmers on water conservation techniques?
   Ngabe umyango wezoku lima eMtubatuba ukuqeqesha abatshala ukuba bonge amanzi ngezindlela eziningi?

   _____

5. Which of the crops requires much water to survive?
   Iziphi izitshalo ezidinga amanzi amaningi ukuze zikhule kahle?

   _____

6. Which of the crops needs little water to survive?
   Iziphi izitshalo ezidinga amanzi amancane ukuze zikhule kahle?

_____

7. In what ways has the Department of Agriculture supported subsistence farming in Ward 19?
   Iziphi izindlela uMnyango wezoLimo owalekelela ngazo ukuphumelelisa ukutshala kwasemakhaya endaweni eWadi ye-19?

   _____

8. Are there any specific reasons why the farm location was chosen as a site for the project? Please explain if there any reasons in relation to water supply?
   Ngabe zikhona izizathu ezisobala ukuba indawo yokutshala ikhethwe njengendawo yokusebenzela? Ngicela ukuba uchaze kabanzi uma zikhona izizathu ezihambiselana nokuphakelwa kwamanzi?

   _____

Section C- Recommendations

Isigaba C- Izincomo

1. How can subsistence farming be improved by farmers of Ward 19
   Abalimi base Ward 19 bangakwenza ngcono kanjani ukulima kokuziphilisa?

   _____

2. What changes will you like to see as regards to water supply for agricultural purposes in Ward 19?
   Iluphi ushintsho ongathanda ukulibona mayelana nokulethelwa kwamanzi azofeza izinhloso kwezokutshalwayo eWadi ye-19?

   _____

3. What recommendations will you give to improve water conservation techniques in Ward 19?
   Imiphi imibono onayo engasiza ekongweni kwamanzi eWadi ye-19?

   _____

4. What recommendations will you give to support crop yield during water shortage?
   Imiphi imibono onayo engasetshenziswa ukukhulisa izitshalo umo amanzi enngatholakali?

   _____

APPENDIX H: CORRELATION TABLE

			What water conservation technique do you use?	The Mtubatuba Municipality trains farmers on water conservative methods	Water shortage is experienced often	There has been improvement in water conservative techniques in Gunjaneni in the last year	What farming activities do you use water for?	Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?	Where do you obtain water during water shortage?	Insufficient water supply is the main constraint to development of subsistence farming in Ward 19?	There has been an improvement in water supply for subsistence farming in the last year in Ward 19?	Others
Spearman's rho	What water conservation technique do you use?	Correlation Coefficient	1.000									
		Sig. (2-tailed)										
		N	42									
	The Mtubatuba Municipality trains farmers on water conservative methods	Correlation Coefficient	.187	1.000								
		Sig. (2-tailed)	.236									
		N	42	42								
	Water shortage is experienced often	Correlation Coefficient	-.018	-.430**	1.000							
		Sig. (2-tailed)	.908	.004								
		N	42	42	42							
	There has been improvement in water conservative techniques in Gunjaneni in the last year	Correlation Coefficient	-.008	.240	-.208	1.000						
		Sig. (2-tailed)	.957	.126	.186							
		N	42	42	42	42						
	What farming activities do you use water for?	Correlation Coefficient	-.045	.005	.172	-.016	1.000					
		Sig. (2-tailed)	.777	.975	.277	.919						
		N	42	42	42	42	42					
	Give an estimated amount of water used daily for agricultural purposes (in kilolitres)?	Correlation Coefficient	-.080	.360*	-.452**	.299	-.138	1.000				
		Sig. (2-tailed)	.613	.019	.003	.055	.385					
		N	42	42	42	42	42	42				
	Where do you obtain water during water	Correlation Coefficient	-.043	.012	-.194	.008	-.038	.034	1.000			
		Sig. (2-tailed)	.789	.941	.218	.959	.812	.831				

shortage?	N	42	42	42	42	42	42	42			
Insufficient water supply is the main constraint to development of subsistence farming in Ward 19?	Correlation Coefficient	.078	.097	.078	-.161	.113	-.198	.150	1.000		
	Sig. (2-tailed)	.626	.541	.623	.309	.475	.209	.342			
	N	42	42	42	42	42	42	42	42		
There has been an improvement in water supply for subsistence farming in the last year in Ward 19?	Correlation Coefficient	.243	.441**	-.197	.256	.015	.399**	.047	-.050	1.000	
	Sig. (2-tailed)	.122	.003	.210	.102	.925	.009	.767	.755		
	N	42	42	42	42	42	42	42	42	42	
Others	Correlation Coefficient	-.148	.060	0.000	-.139	.407	.129	.407	.741*	-.337	1.000
	Sig. (2-tailed)	.683	.870	1.000	.701	.244	.722	.244	.014	.341	
	N	10	10	10	10	10	10	10	10	10	10
What recommendations can you give to improve water conservation for subsistence farming in Gunjaneni?	Correlation Coefficient	-.046	.147	-.144	.212	.019	.457**	-.311*	-.209	.353*	-.340
	Sig. (2-tailed)	.773	.354	.361	.179	.903	.002	.045	.184	.022	.336
	N	42	42	42	42	42	42	42	42	42	10
What recommendations can you give to sustain crops during water shortage?	Correlation Coefficient	-.205	-.142	.007	.060	.285	.191	.147	-.049	.152	-.093
	Sig. (2-tailed)	.193	.370	.966	.708	.068	.227	.353	.760	.335	.797
	N	42	42	42	42	42	42	42	42	42	10
What changes will you like the authority to make as regards to water supply for subsistence farming?	Correlation Coefficient	-.167	.228	-.182	-.100	.106	.204	.405**	.085	.159	.456
	Sig. (2-tailed)	.292	.147	.249	.528	.502	.194	.008	.592	.313	.185
	N	42	42	42	42	42	42	42	42	42	10
What are the main factors affecting the growth and development of subsistence farming in Gunjaneni?	Correlation Coefficient	-.111	.243	-.324*	.328*	-.112	.134	.292	.047	.013	-.126
	Sig. (2-tailed)	.483	.122	.036	.034	.481	.397	.061	.768	.935	.728
	N	42	42	42	42	42	42	42	42	42	10

APPENDIX I: LETTER OF AUTHORISATION FROM THE DEPARTMENT OF WATER AFFAIRS

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

ENQ: M Singh
TEL:031–336 2748
REF: Ola Masters

15 August 2013

To whom it may concern

This letter serves to confirm that the Department is aware that Mr Olayemi R Bakre, student number: 21243119, is a registered Master student at the Durban University of Technology. His study is on: Water resources management for subsistence farming in the Gunjaneni area Mtubatuba in KwaZulu-Natal.

There are no objections to his study, and it is encouraged that he has access to relevant personnel and information to assist in his study.

With regards

[redacted]

Michael Singh
Deputy Director
Water Regulation and Use
Department of Water Affairs
KwaZulu-Natal

APPENDIX J: ETHICS LETTER

MANAGEMENT SCIENCES: FACULTY RESEARCH ETHICS COMMITTEE (FREC)

16 October 2013
Student No:
FREC No: 15/13FREC

Dear Mr Bakre

MASTERS DEGREE IN TECHNOLOGY: PUBLIC MANAGEMENT

TITLE: WATER RESOURCE MANAGEMENT FOR SUBSISTENCE FARMING IN THE GUNJANENI AREA OF MTUBATUBA IN KWAZULU-NATAL

Please be advised that the FREC Committee has reviewed your proposal and the following decision was made: Ethic Level 1 - Full Approval

Approval has been granted for a period of one year, after which you are required to apply for safety monitoring and annual recertification. Please use the form located at the Faculty. This form must be submitted to the FREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the FREC according to the FREC SOP's.
Please note that ANY amendments in the approved proposal require the approval of the FREC as outlined in the FREC SOP's.

Yours Sincerely

[redacted]

Prof N Dorasamy
FREC: Chairperson

APPENDIX K

LETTER OF CONSENT AND INFORMATION

LETTER OF INFORMATION

WATER RESOURCE MANAGEMENT FOR SUBSISTENCE FARMING IN WARD 19 OF KWAZULU-NATAL

Principal Investigator/s/researcher: (Bakre R. O, Bachelor of Science: Economics)

Co-Investigator/s/supervisor/s:

(Prof Nirmala Dorasamy, Associate Professor: Dept of Governance and Economic Development)

(Dr Ivan Govender – D Admin., B Sc., B Com., MBA., CFP., LLB.)

Brief Introduction and Purpose of the Study:

This study focuses on a water-scarce subsistence farming community in Ward 19. It is located in Mtubatuba Municipality in KwaZulu-Natal. Ward 19 is the largest ward in KwaZulu-Natal, and among the poorest in South Africa. The community is in need of further development as it lacks adequate access to basic services such as water, electricity, sanitation and tarred roads. The poor quality housing and lifestyle of residents are indicators to a poor socio-economic background. Subsistence farming is the dominant economic activity, with parts of the surrounding area remaining unused, as it is partly covered with invasive alien plants.

The purpose of the research is to analyse the importance of water as a resource for rural development. It also aims to determine the effect of water supply on the agricultural sector in rural areas of South Africa.

Outline of the Procedures:

1. The 50 participants in this study are expected to fill questionnaires relating to agricultural and water issues.
2. The questionnaires will be given out at the case study area (Ward 19).
3. Each of the participants will be guided while filling the questionnaire to ensure they understand the questionnaires being asked.
4. It will take each of the participants about 15-30 minutes to fill a questionnaire.

Risks or Discomforts to the Participant: None

Benefits: Improved standard of living to participants, and also a publication.

Reason/s why the Participant May Be Withdrawn from the Study:

Participants may be withdrawn from participating if they are non-compliant, ill or as a result of an adverse reaction. Participants could also withdraw from participating if they so wish.

Remuneration: None

Costs of the Study: R9,000

Confidentiality: Names of participants would not be mentioned, and if for any reasons named are mentioned, permission will be requested from participant(s) first.

Research-related Injury: Possibility of research – related injury not feasible.

Persons to Contact in the Event of Any Problems or Queries:

Prof Nirmala Dorasamy (Supervisor)-0313736862

Dr. Ivan Govender (Co- supervisor) - 0313735694

Olayemi Bakre (Researcher) - 0746047056, or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

General:

Potential participants must be assured that participation is voluntary and the approximate number of participants to be included should be disclosed. A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population e.g. isiZulu.

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (Olayemi Bakre), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself

prepared to participate in the study.

- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Olayemi Bakre, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Bakre Abd-Rahman Olayemi		_____
Full Name of Researcher	**Date**	**Signature**

_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**

_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Please note the following:

Research details must be provided in a clear, simple and culturally appropriate manner and prospective participants should be helped to arrive at an informed decision by use of appropriate language (grade 10 level - use Flesch Reading Ease Scores on Microsoft Word), selecting of a non-threatening environment for interaction and the availability of peer counseling (Department of Health, 2004)

If the potential participant is unable to read/illiterate, then a right thumb print is required and an impartial witness, who is literate and knows the participant e.g. parent, sibling, friend, pastor, etc. should verify in writing, duly signed that informed verbal consent was obtained (Department of Health, 2004).

If anyone makes a mistake completing this document e.g. wrong date or spelling mistake a new document has to be completed. The incomplete original document has to be kept in the participant file and not thrown away and copies thereof must be issued to the participant.

References:

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes* http://www.doh.gov.za/docs/factsheets/guidelines/ethnics/

Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed. Available at: http://www.nhrec.org.za/?page_id=14

Faculty of Management Sciences

Department of Governance and Economic Development

Date-

Dear Participant

I am currently undertaking a research project as part of my studies towards a Masters degree in

Technology: Governance and Economic Development at Durban University of Technology. The study aims to

analyse the importance of water as a resource to contribution of rural development.

Would you agree to complete a questionnaire for the study? The questionnaire will take approximately

20 minutes. Participation is voluntary and you are free to withdraw from the study at any time without

giving reasons, and without prejudice or any adverse consequences. The information you give will

only be used for research purposes and will be aggregated with other responses and only the overall or average information will be used. Your identity and individual answers will be kept totally confidential. Should you wish to discuss this further please feel free to contact me or my supervisor, Professor Nirmala Dorasamy, 0313736862, nirmala@dut.ac.za or the IREC Administrator, Lavisha Deonarian: 031 373 2900 or LavishaD@dut.ac.za .

Your assistance will be much appreciated,

Yours faithfully

_____

Student - Olayemi Bakre

Contact Details – +2774 604 7056

Email- bakreolayemi@yahoo.com

_____

Supervisor / Promoter- Prof Nirmala Dorasamy

Contact Details- +27(31)3736862

Email - nirmala@dut.ac.za

_____

Co-Supervisor/Co-Promoter- Dr. Ivan Govender

Contact Details- +27(31)3735694

Email- ivang@dut.ac.za

(LETTER OF CONSENT IN ISIZULU)

Lunga elizoba yingxenye yocwaningo

Njengamanje ngenza ucwaningo njengengxenye yesifundo zami ze-M Tech: Governance and Economic Development e-Durban University of Technology. Ucwaningo luhlose ukucubungula ukubaluleka kwamanzi njengensiza ekulekeleleni ukuthukiswa kwasezindaweni zasemakhaya.

Uyacelwa ukuthi ugcwalise iphepha lemibuzo yocwaningo. Ukuphendula kuzothatha cishe imizuzu engama-20. Ukuba yingxenye kuwukuzinikela futhi ukhululekile ukuhoxa ocwaningweni nganoma isiphi isikhathi ngaphandle kokunika izizathu, ngaphandle futhi kokucatshangelwa noma imiphumela engemihle ezoqhamuka.

Ukwazi ozolukhipha luzosethenziselwa izinhloso zocwaningo kuphela futhi luzohlanganiswa nezinye izimpendulo kanti ulwazi oludidiyelwe noma oluhlanganisiwe kuphela oluzosetshenziswa. Ukuthi ungubani kuzoba yimfihlo futhi izimpendulo zizogcinwa ziyimfihlo ngokuphelele.

Uma ufisa ukuxoxa ngalokhu kabanzi ukhululekile ukuxhumana name noma umqaphi wami, uSolwazi uNirmala Dorasamy, 031 3737 6862, nirmala@dut.ac.za noma umphathi we-IREC, uLavisha Deonarian: 031 373 2900 noma ku-Lavisha@dut.ac.za

Ukulekelela kwakho kuyothokozeleka kakhulu.

_____

Student - Olayemi Bakre

Contact Details – +2774 604 7056

Email- bakreolayemi@yahoo.com

_____

Supervisor / Promoter- Prof Nirmala Dorasamy

Contact Details- +27(31)3736862

Email - **nirmala@dut.ac.za**

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