Assessing the Socio-Economic Impact of Drought in Goedgevonden Village, Ventersdorp Local Municipality in North West Province, South Africa

Siphiwe Caleni

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Supervisor: Alice Ncube

Declaration

I, Siphiwe Caleni, declare that the master's degree dissertation that I herewith submit for the master's degree qualification *Master of Disaster Management* at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

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Siphiwe Caleni
Student number: 2005074345

September 2017

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As iron sharpens iron,
so one person
sharpens another

Proverbs 27:17

Abstract

The purpose of this study was to assess the socio-economic impact of drought in the Goedgevonden village within the Ventersdorp Local Municipality in the North West Province, South Africa. The Southern Africa region has experienced El Niño events in the past with cyclical rainfall periods that has affected agricultural yields negatively over the years. Drought has been known to have an adverse impact on households, resulting in the disturbance on household livelihoods that include crops and livestock farming. Understanding the extent at which local communities perceive climate change and its related impacts on households, their responses were insightfully important for developing effective disaster management strategies.

A mixed method approach of research was applied to assess the socio-economic impact of droughts and the actions being undertaken by the households and the municipality to avert the situation. Both a qualitative and quantitative analysis was used for data collection by means of a structured questionnaire that was drawn from a total of 87 households in the Goedgevonden. The questionnaire was divided into three sections to elicit demographic information, as well as the social and economic impact of drought of respondents. The study revealed how community members were devastated by the drought to the extent that the local dam ran dry, and livestock and crop farming had water shortages. Learners had to frequently absent themselves from attending school which had a negative impact on their academic performance. Relief measures such as water supply, medication and fodder were not enough to cater for the growing population of the Goedgevonden village during the drought episode.

The study found that there was a need for the disaster management department at the local municipality to deliver a legal basis for development of disaster risk reduction to mitigate drought to ensure protection of the socio-economic status of the community. The study therefore recommended that the municipality, community, private sector, farmers and education work together to enable the community to attain knowledge and skills that will empower them to make radical decisions concerning their socio-economic situation. Dependency mentality on the government by the community should be replaced by poverty alleviation projects. Women were in the majority as household heads in the area as the study revealed that projects such as hair salons, knitting and embroidery can be followed to generate an income.

Keywords: drought, disaster management, disaster risk reduction, Goedgevonden

Table of Contents

List of Tables

LIST OF FIGURES

List of Abbreviations and Acronyms

ADMP	Agricultural Drought Management Plan
DAFF	Department of Agriculture, Forestry and Fisheries
DFID	Department for International Development
DRR	Disaster Risk Reduction
ECLAC	Economic Commission for Latin America and the Caribbean
ENSO	El Niño−Southern Oscillation
FAO	Food and Agricultural Organization
GIS	Geographic Information System
GDP	Gross Domestic Product
IDP	Integrated Development Plan
KPAs	Key Performance Areas
NDA	National Department of Agriculture
NDMC	National Disaster Management Centre
NDMF	National Disaster Management Framework
NGOs	Non-Governmental Organisations
RSA	Republic of South Africa
SALGA	South African Local Government Association
SLF	Sustainable Livelihoods Framework
Stats SA	Statistics South Africa
TRAC	Transvaal Rural Action Committee
UK	United Kingdom
UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Reduction
USDR	United States Department of Agriculture

Chapter 1
Introduction

1.1 General background

South Africa is going through environmental challenges that are beyond human control. There is a need to examine measures that could assist in adapting to natural hazards such as earthquakes, flooding, drought and epidemic diseases that have a negative effect on all nations. There is also a need to look at the socio-economic impact of these disasters on both farmers and communities of our country to come up with relevant coping mechanisms.

Drought happens frequently in South Africa and its occurrence, together with the intensity thereof, has escalated in recent years, resulting in loss of lives (Calow, 1998). The impact of drought brought serious damages to society, the economy and the environment (Economic Commission for Latin America and the Caribbean [ECLAC], 2003). Government and societies are unprepared for drought eventualities, which lead to an increase in the vulnerability of communities (Calow, 1998). With the exception of climate, drought has been a recurring event, where people have aggravated the situation by causing damage to the environment and degradation of arable land (Calow, 1998).

The blame is placed on the climate phenomenon *El Niño*, which is the Spanish word for 'little boy' and refers to the Christ Child, because the weather pattern is frequently prominent over the Christmas period during December and January (Dilley et al., 2014:101). Affected areas suffer drought conditions during El Niño events where there is natural warming of the surface temperatures of the Pacific Ocean which takes place approximately every two to seven years (Dilley et al., 2014:101). The change in ocean temperature brings dramatic effects on the weather around the world. The vast majority of arable land is destroyed, resulting in livestock deaths and food insecurity.

The Minister of Agriculture, Forestry and Fisheries, Senzeni Zokwane, said that South Africa has been hit by a drought impact on crops which resulted in the lowest production of maize since 2008 (News 24, 15/11/2015). Maize is the staple food of many people in the country, therefore the precipitation variability leads to a food security crisis (Watkinson and Makgetla, 2002). Drought threatens cultivation on more rain-fed hectares, and most vulnerable are traditional farmers and those who are least resilient to climate associated setbacks.

The word *disaster* is explained as a serious disruption of the functioning of a community or society, bringing widespread human, material, economic or environmental losses which

surpass the ability of the affected community or society to cope using its own resources (United Nations. International Strategy for Disaster Reduction [UNISDR], 2002:24).

The North West Province is one of the provinces in South Africa that has experienced a serious drought disaster as a result of El Niño. The North West Province went through one of the common types of drought disasters in the years 2014/15. Municipal areas which were seriously affected are the Mahikeng, Kagisano-Molopo and Greater Taung Local Municipalities, the Dr Kenneth Kaunda District Municipality, as well as Magalies Water who supplies water to municipalities.

The case study will focus on the Goedgevonden rural Village within the Dr Kenneth Kaunda District Municipality where many farmers lost their livestock due to excessive evaporation which depleted the water that was available for animals and plants. The community of Goedgevonden village suffered a great deal during the drought where there were comments on shortage of drinkable water which made schools, clinics and society to operate uncharacteristically and the community lost their livelihoods as community members made remarks.

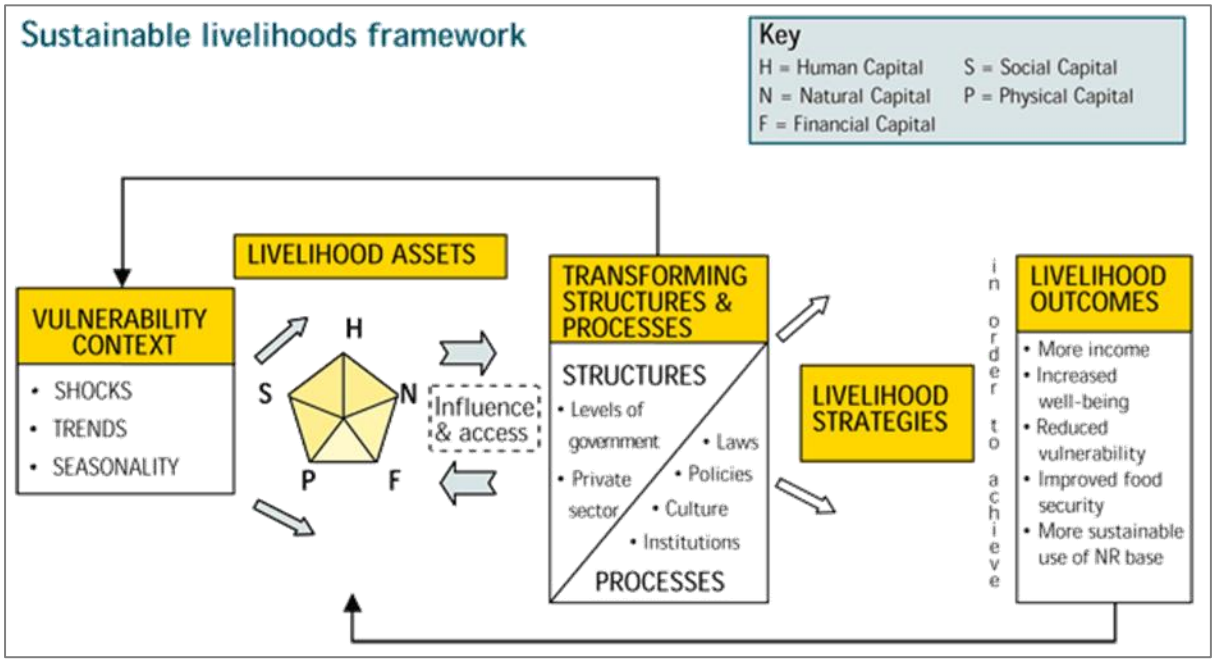
To understand the impact of the drought clearly, the different types of droughts as stated by Bang and Sitango (2003:64) needs to be considered, namely meteorological, hydrological, socio-economic and agricultural droughts which are summarised below and explained in detail in Chapter 2:

- **Meteorological drought** is explained as a decreasing incidence of rain, beginning during the ordinary season on towards the period of a dry season.
- **Agricultural drought** is when the humidity in the soil is not sufficient to assist crop production and growth in the area. The vegetation's demand for water relies on the type of plant and its stage of growth as well as soil properties.
- **Hydrological drought** is the shortage of surface and subsurface water supplies.
- **Socio-economic drought** is when economic activities are aligned with other elements that do not meet the population demands. The focus on this study will be based on this type of drought on the community of Goedgevonden village during the 2014/15 period.

While there are four different types of drought as mentioned above, the emphasis will be on assessing how the community of the Goedgevonden village was impacted socially and economically. According to Ngaka (2012:41), the activities such as crop farming and grazing conditions for livestock remain vulnerable during the drought and the rural communities rely

on these farming activities to generate income. Vogel (1994:5) supported the argument as he perceived that drought events weaken the socio-economic life and the agricultural production of the community. The conditions such as these were the focal points of study in the Goedgevonden village.

The United Kingdom Department for International Development (UK DFID, 1999) designed the sustainable livelihoods framework (SLF) that can be used to plan new development strategies that is essential for monitoring and building sustainability within the societies as shown in Figure 1.1.



Source: UK DFID (2005)

Figure 1.1: Sustainable livelihoods framework

The significance of this framework is to provide assistance to various stakeholders with different views to take part in structured discussions. These structures enrich stakeholder knowledge of the factors that affect the livelihoods of societies and help in various means in finding appropriate strategies to develop sustainable livelihoods (UK DFID, 1999). The sustainable livelihoods components as adapted from the UK DFID (1999) are captured as vulnerability context, livelihoods assets, transforming structures and processes, livelihoods strategies and livelihoods outcomes. They are summarised below:

Vulnerability context

The vulnerability context is built around the outside environment where people live. The person's livelihood and full access to assets are determined by shocks such as droughts, economic trends and seasonality (poor production) (Chambers and Conway, 1991:57).

Livelihoods assets

Society needs various assets to realise a positive livelihoods consequence in their lives. The SLF identifies five capital assets that constitute livelihoods building that can be applied in developing disaster risk reduction strategies (Chambers and Conway, 1991:58), namely:

- Human capital, for example knowledge and skills.
- Social capital, for example interrelations and connectedness.
- Natural capital, for example vegetation and land.
- Physical capital, for example infrastructure and technology.
- Financial capital, for example financial resources.

Transforming structures and processes

These are the international or national governance structures and policies aiming at influencing the societies to be able to improve certain livelihoods and render it safe from disaster risks. These structures can either hinder or assist the societies in increasing working livelihoods strategies (UK DFID, 1999:3).

Livelihoods strategies

These strategies try to develop an understanding of the various factors that influence societal choices of livelihoods strategies, reinforce the prevailing positive factors and mitigate negative influences. The livelihoods strategies can be transformed into livelihoods that are more hands-on in accordance with societal needs (UK DFID, 1999).

Livelihoods outcomes

Livelihoods outcomes provide societies with future prospects that are filled with willpower and flexibility to adapt when faced with disaster challenges. The outcome component strengthens the objective of a survey by displaying a significant tool to mitigate the drought impact (UK DFID, 1999).

The severity of the drought in the North West Province has had various impacts on communities, especially for communal farmers as the fall in crop production affected their livelihoods, their water resources were being lost, and vegetation and livestock decreased. The South African government and the agricultural sector have been involved with measures of drought relief as a national effort to assist in drought affected areas. The study aims to evaluate how the society and economy were impacted in 2014/15 and the measures implemented to mitigate to these impacts. The background information provided below it will illustrate the exact position of the Goedgevonden in the North West Province.

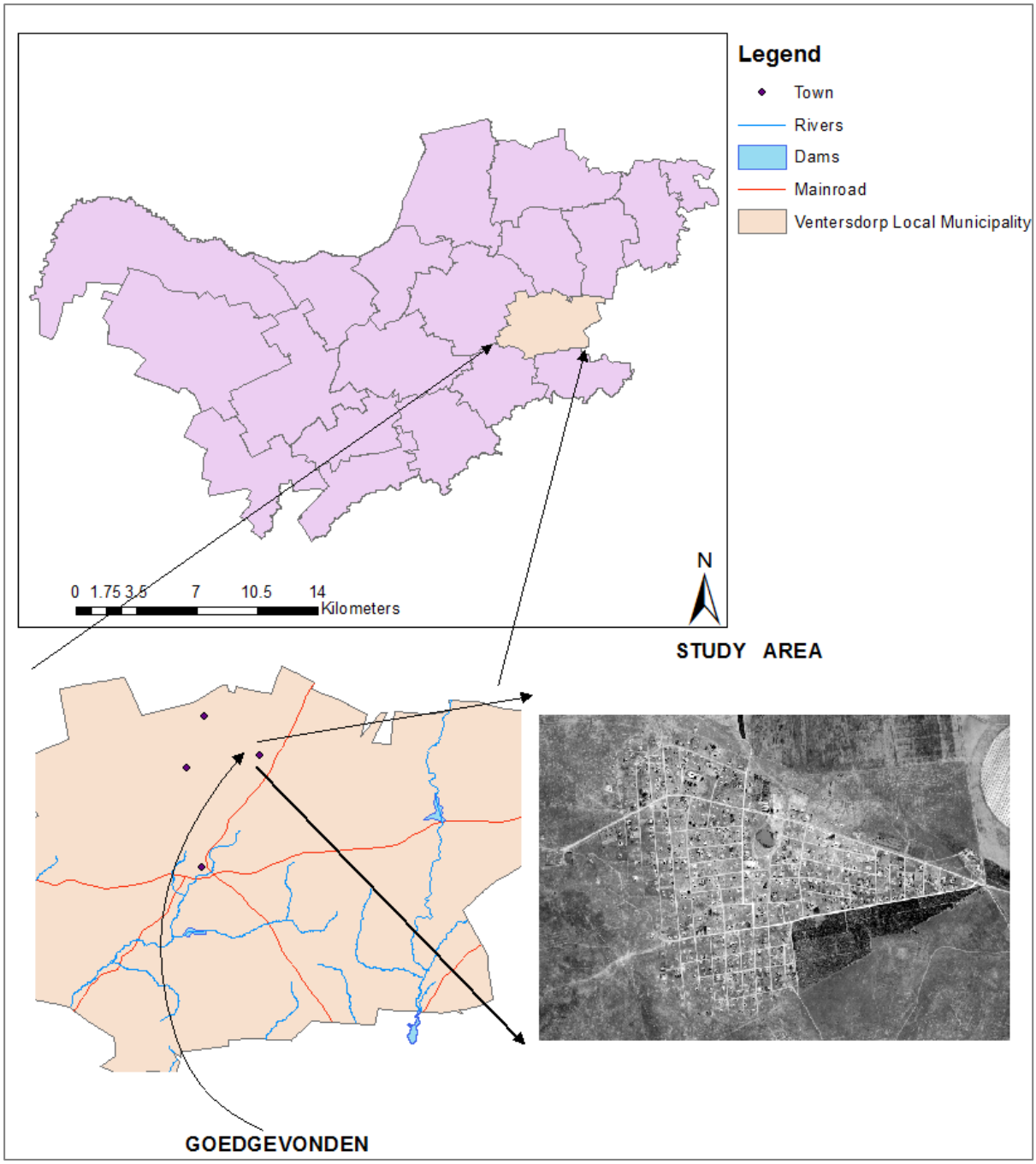
The application of the UK DFID model will be fully applied in the next chapter so as to look at how socio-economic issues are derived from the SLF.

1.2 Background and description of study area

The case study solely focuses on the social and economic impact of the drought in the Goedgevonden village within the Dr Kenneth Kaunda District Municipality in the North West Province. The community of the Goedgevonden village occupied the area since 1947, but were forcefully removed in 1983 by the apartheid government (Transvaal Rural Action Committee [TRAC], 1991). They were moved to the former Bophuthatswana area, which is about 170 km away. They lost access to three-quarters of the land originally allocated to them, until they forced themselves back to Goedgevonden in 1998 after the inception of the new democratic government in South Africa. The living conditions were not suitable for the community as their cultivated land was no longer suitable for ploughing like it was twenty years before (TRAC, 1991). The conditions made them vulnerable as they lost some members who had skills for farming and the land was no longer fertile for crop farming, food security was compromised and their livelihoods suffered a great deal. Some young energetic community members were forced to leave Goedgevonden village as they realised that the area did not have the potential to meet their livelihood demands.

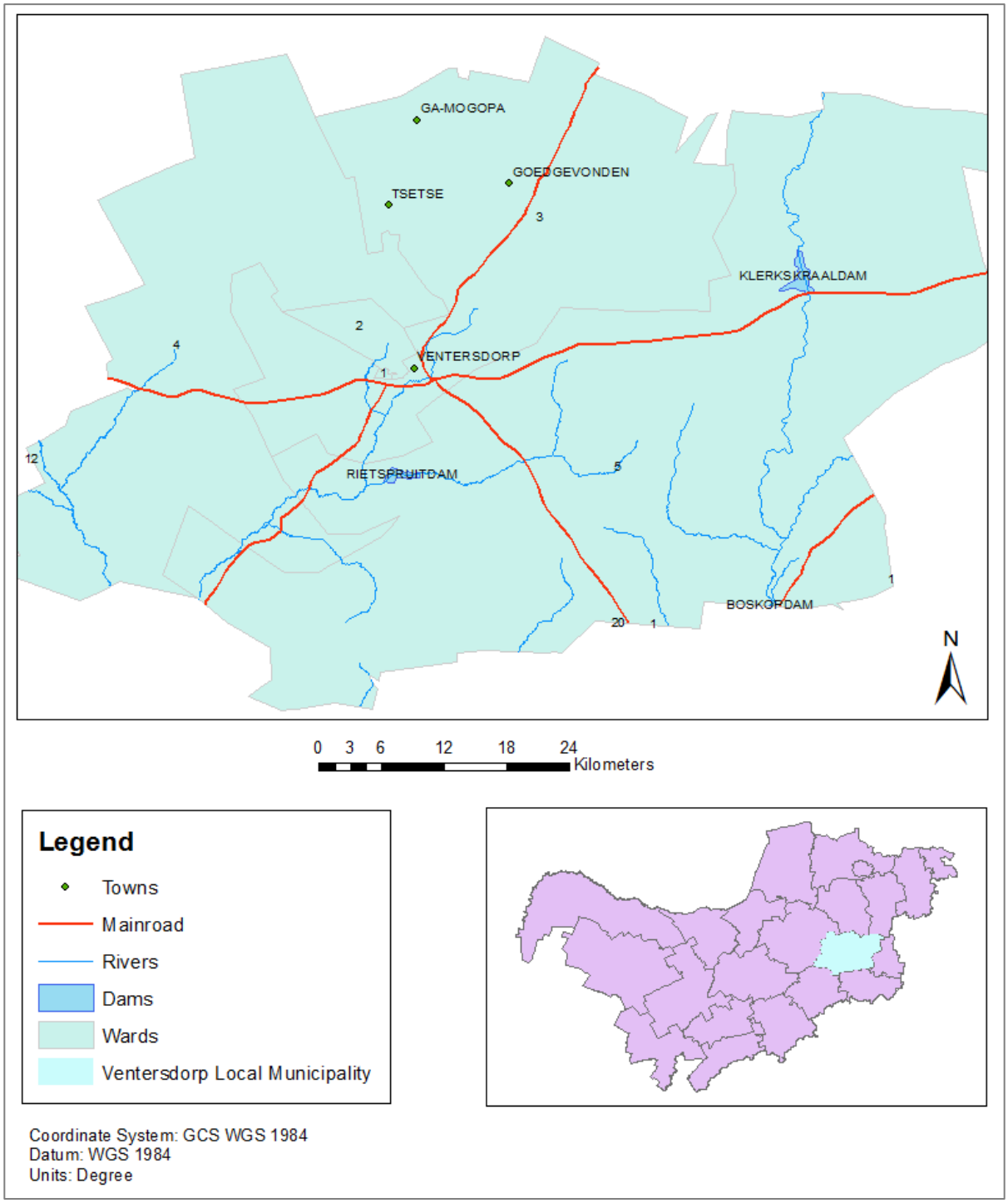
The government issued a tractor, ploughing equipment and production inputs with the purpose to develop these subsistence farmers, but the efforts did not work as the equipment disappeared and farming could not prosper in the village (TRAC, 1991). The national government issued about R16 000 as means to help the entire group of farmers again, but this also did not sustain them because the money was not used properly and they felt it was limited as it could not sustain them. The farmers, livelihoods and the community struggled as they relied on government assistance which could not sustain them economically and socially.

Ventersdorp is situated at the coordinates 26° 19' S and 26° 49' E as illustrated in Figure 1.2, and Goedgevonden village about 18 km from the Ventersdorp town (Ventersdorp/Tlokwe municipality). The area is surrounded by other villages, Tsetse and Ga-Mogopa (Figure 1.3). The population is approximately 4 934 with almost 780 households and has two schools, the Tshirollogo Primary School and Poelano Secondary School. There is one crèche and one community hall. The community relies on subsistence farming and livestock farming where government provides grants in a way of trying to alleviate poverty as many people are not working. (See the illustration in Table 1.1.)



Source: Geographic Information System (GIS) Maps (2016)

Figure 1.2: GIS Map of the North West Province and aerial photograph of Goedgevonden village in South Africa



Source: GIS Maps (2016)

Figure 1.3: GIS map of available sources of water within the Ventersdorp Local Municipality

TABLE 1.1: SUMMARY OF THE POPULATION OF GOEDGEVONDEN

Population characteristics	Male	Female	Total
Employed	234	123	357
Unemployed	458	509	967
School learners	818	704	1 522
Not economically active	741	828	1 569
Other	211	308	519
Total	2 462	2 472	4 934

Source: Statistics South Africa 2009

Due to drought conditions at Goedgevonden, farming in crop production was practised at a low rate and the majority of the farmers were forced to operate at a small scale. Some farmers were forced to sell their livestock (cattle and sheep) as the fodder supplied by the municipality could not sustain them (RSA, Department of Agriculture, Forestry and Fisheries [DAFF], 2016). Water restrictions were effected as boreholes and dams in the area ran dry and livelihood, schools for children, and health were negatively affected.

Section 24(b) of the Constitution of the Republic of South Africa (RSA, 1996) states that everyone has the right to have the environment protected for the benefit of present and future generations, with the means to ensure ecological sustainable use of natural resources, hence the drought calls for the development of a risk management system.

There was need to involve everyone in mitigating the situation by applying proper planning and risk management by the district municipality's disaster management section and the village community to bring the situation under control. According to United Nations International Strategy for Disaster Reaction (UNISDR, 2004), the disaster risk reduction strategy can mitigate the adverse impact of drought in the community through focus on resilience building. The developing countries are challenged to design Poverty Action Programmes, which will focus specifically on poor rural and urban societies. The programmes should be aligned in such a way that they meet the individual community needs and support its efforts to build resilience and capacity to endure existing or potential disaster risks (Africa Regional Strategy for Disaster Risk Reduction, 2004).

1.3 Problem statement

Drought is seen as a physical or natural hazard and it has many implications on social elements where it weakens the socio-economic life of the society and agricultural yields of the farmers (Vogel, 1994:5). The society of Goedgevonden suffered as production from

agriculture declined and the livelihoods being disturbed as farmers depended on water to be able to produce.

When a drought occurs, the town and the rural communities are left without livelihoods and commercial farmers suffer from both stock and crop losses. Goedgevonden village suffered from a shortage of drinking water and water for domestic purposes. Farmers lost a large area of arable land and livestock which impacted on their economic well-being and the community is living in extreme poverty.

The management of drought in South Africa has had many shortcomings as government structures have been responding slowly and ineffectively to drought over the past years (RSA, NDA, 2005a). The discussion to follow will look at the socio-economic impact the drought has brought to the tiny village of Goedgevonden over the past years (2014/15). The community's susceptibility has been aggravated by the fact that they did not have a sense of ownership and responsibility for the projects that were implemented in the past, namely failure to take care of tractors that were provided by the municipality and the financial aid provided. The community should have collaborated with the management of the project if ever the sense of project ownership was to be attained. As stated by Sawalha (2015), failing to work together in times of disaster events, leads to increase in the vulnerability of the community. This reflects the worth of collaboration amongst the different structures during the time of catastrophe.

The survey that was undertaken looked at the level of distraction the village went through during the drought, including the community's vulnerability, how the farmers were affected by the droughts as well as the impact on the society in terms of livelihoods. Emphases were also being placed on the drought plan of the provincial government regarding the drought. It was also necessary to look into the sources of water within the area such as the rivers, boreholes and availability of water storage dams.

The study also looked at the level of the disaster management plan within the area to establish whether the community had ever been informed of an emergency plan for the drought event as well as the level of vulnerability of the community and impact on livelihoods. The promotion of an indigenous knowledge system and early warning system was significant for developing relevant local drought indicators on time and to verify the drought frequency, also communicating warnings to the community (UNISDR, 2007). The South African Weather Bureau once predicted the heat wave coming to South Africa, but the disaster management within the province was caught unprepared as they did not have a plan in place for the eventuality. The Meteorological Service Division (2013) provided weather forecasts and a seasonal rainfall outlook that monitored and reported on the performance and progress

regarding rainfall outlooks. The lack of rainfall would lead to a poor harvest, and poor pastures, leading to loss of livestock where animals become emaciated to the extent that it becomes difficult to sell.

The focus was on how the municipality reacted and taken mitigation measures, after realising the decline in water level weeks before the drying of many parts of the area within the Ventersdorp Local Municipality[1]. Early warning system, coupled with the indigenous knowledge system on drought, are essential ingredients to make the community cope with the event. As long as the community's resilience in the face of a disaster is not developed, they are bound to suffer more from the event of a drought disaster.

1.4 Research questions

The following research questions were formulated to guide the research:

- What were the socio-economic effects of the 2014/15 drought in the Goedgevonden village?
- What was the standing of the drought mitigation plan in 2014/15 in the Goedgevonden village and what is the current standing?
- Did the government do enough to support farmers during 2014/15 and what do the South African policy and practices say regarding mitigation?
- What are the recommendations that can be offered for future socio-economic impacts of drought in the Goedgevonden village?

1.5 Aim and research objectives

Goedgevonden village was going through drought challenges that needed immediate attention as a means to build community resilience in order to fight poverty and dependency mentality. The population was growing gradually and the drought was impacting on food security and livelihoods. Many people were not working and they depended on agricultural and livestock farming. There was a need for the application of appropriate measures to mitigate the situation.

[1] Since the start of this research, the Ventersdorp Local Municipality was disestablished and merged with the Tlokwe City Council Local Municipality to establish the Ventersdorp/Tlokwe Local Municipality. All information regarding the Ventersdorp Local Municipality used in this research was before it was disestablished and became the Ventersdorp/Tlokwe Local Municipality.

1.5.1 Aim

The aim of the study was to determine the extent to which the drought had impacted on the society and the economy of Goedgevonden village in the Ventersdorp Local Municipality in 2014/15 and provide measures to mitigate the problem.

1.5.2 Research objectives

The following objectives were formulated to achieve the aim of the research:

- To evaluate the extent to which the drought affected the socio-economic status of Goedgevonden village in 2014/15.
- To evaluate the status of drought mitigation strategies and plans in the Goedgevonden village in 2014/15.
- To evaluate the magnitude of support the community of Goedgevonden received from government and how far policies and practices were followed in 2014/15.
- To offer the recommendations for a future socio-economic impact of drought in the Goedgevonden village.

1.6 Significance of the study

The findings will be proposed to the North West Provincial Government and the Ventersdorp Local Municipality to enable them to apply in it the future should a similar event occur. The document could be used to communities and the farmers to capacitate them with significant knowledge that will be applied should the event arise in the future. An event of this magnitude has never happened in the area since a very long time; there is therefore a need for the community members to be resilient and to be taught on how to mitigate the situation in terms of water storage and usage. Farmers need to be engaged in drought mitigation programmes and workshops that will empower them with essential knowledge of dealing with a drought.

Drought calls for the development of a risk management system which is contained in the White Paper on Disaster Management, that features prevention, reduction of disasters, mitigation, preparedness, response, recovery and rehabilitation (RSA, NDA, 2005b:4). The study was different in the sense that focused on coping strategies for households, farmers and institutions to strengthen their resilience capacity in the future.

Various ranges of disaster risk management mechanisms have been put in place to minimise the devastating effects of drought in South Africa (Van Zyl, 2006:31). Those mechanisms are social welfare programmes such as drought relief funding for communal farmers, early warning systems, food aid for poor households, supply of fodder and drought task teams to enable

land use planning. Vogel et al. (2010), contended that these programmes are responsive in nature and do not sustain the livelihoods of the communities. There is a need for pre-emptive risk reduction approach to safeguard the livelihoods.

The UNISDR (2002) showed that the early warning for drought prediction and assessment, monitoring and assessment for desertification are basically interconnected and nonetheless operate differently. Some of the drought impacts and mitigation measures will be introduced under the preliminary literature study that follows below.

1.7 Preliminary literature study

This involves the tracing, identifying and analysis of materials that contain information referring to the research problem (Neuman, 1994). Different literature materials were perused to look into how the drought has impacted South Africa as well as other areas of the world. The primary and secondary sources were utilised to assist with documentation regarding drought disasters and vulnerability of society, risk and vulnerability mapping and statistical records of the area.

The Disaster Management Act, Act 57 of 2002 (RSA, 2002:6), regards disaster management as a continuous and integrated multi-sectoral, multidisciplinary process of planning and implementation of measures aimed at:

- preventing the risk of disasters;
- mitigating the severity of disasters;
- emergency and preparedness;
- rapid and effective response; and
- post-disaster recovery and rehabilitation.

It is important to look at significant elements in the development of risk. This involves the potential hazard to happen and the extent of susceptibility of that element to exposure by being vulnerable. It is expressed as Risk = Hazard × Vulnerability (UNISDR, 2004). The assessing of risk, based on the hazards and vulnerability analysis, is the best way of knowing how to successfully reduce the disaster in an area affected by drought. Drought management is the collective responsibility of all levels of government, the farmers, private sector, and the community. Although it is seen to be caused by a shortage of rainfall, there are other contributing factors which make a community susceptible (Neuman, 1994).

A literature review is conducted to elaborate on the researcher's insight regarding the fields of research and to demonstrate how the researcher understands the content of the study (De Vos et al., 2011:302). Hazards may occur without resulting into a disaster on the condition that

appropriate measures are put in place to mitigate the situation (Bruwer, 1990). Drought is a serious event in South Africa where there is a need for government capacity and expertise to respond on time and through different farming communities. It has been noticed that the yearly cost of a drought reduction programme is far less than the annual costs of post-drought recovery and rehabilitation, and that prevention is indeed better than cure (Bruwer, 1990). The comprehensive literature study will be unpacked in Chapter 2. In order to discuss the drought impacts, the research design and methodology is discussed below.

1.8 Research design

The case study is made up of mixed methods of design and these are achieved through the study on many theories on the social and economic impacts of drought that are applicable. Research design looks upon planning on scientific enquiry, where the designer comes up with a strategy to find out something (Babbie and Mouton, 2006:72). It looks at a plan of how a researcher intends to conduct a research project.

According to Babbie and Mouton (2006:74), there are two prominent aspects that are core in the research study. The first aspect focuses on the clear specification on what it is that the researcher wants to find out and the second aspect looks at the willpower on the best way to do it. In this study, assessment of the socio-economic impact of drought in the Goedgevonden village was the first core aspect of the research study, while the second aspect was based on determination of the best way to do research work. It provided a guide on how to conduct the study on Goedgevonden village.

As research is a logical model that guides the researcher in the process of collecting, analysing and interpreting of data, there will be a merger between theory and empirical evidence. The process was guided by the principle of data collection which is relevant, reliable, valid and current, regarding the Goedgevonden village in 2014/15.

1.9 Research methodology

The socio-economic drought impact in the Goedgevonden village was assessed using both a qualitative and quantitative research methodology. These two approaches are important in a study as they complement one another (UK DFID, 2005). In this study both approaches were applied in order to achieve the objectives.

Data was gathered from a primary source and secondary source. The primary data was collected through observations and a questionnaire. The secondary source was found in the literature review looking at research problems and research questions. Books, journal articles,

research reports, policies and other sources were consulted with regard to drought globally and drought in South Africa.

The following methods were applied to achieve the objectives of the survey.

1.9.1 Population sample and time frame schedule

Selection of sections

The survey was done according to different community members as Goedgevonden is made up of only one village and did not have many sections and had similar livelihood characteristics. The selection was done in such a way that the community was proportionally selected according to the demand of the survey.

Sampling

Goedgevonden village had an estimated population of 4 900 with around 780 households where an individual household had (plus or minus) six members per family (Stats SA, 2016). The sample chosen is small portion of total set of people which together make up the subject of a survey (Seaberg, cited in Grinnell, 1993). Only a representative group of 87 community members were chosen to share the views on behalf of the whole population in Goedgevonden village to ensure that the whole population group was represented in these discussions. A random sampling technique was applied as it related to Goedgevonden village because community members relied on similar types of livelihoods. The population on 87 members were sampled randomly and questionnaires were filled by 87 members from the entire community. Five research assistants who had undergone in-depth training by the researcher for conducting the questionnaire, assisted in the process.

The sampled 87 population members included community members, a community leader and farmers. The small-scale farmers were targeted either as crop farmers, livestock farmers or mixed farmers within the Goedgevonden village. A household is a group of people in a housing unit that resides together as family and sharing the same house. The household head is the person making decisions (economic or social), irrespective of age and gender within the Goedgevonden village.

The sampling tool, the questionnaire, was used in this regard to gather personal data and opinions (Hopkins and Antes, 1990). This tool assisted in collecting information from subjects that might not be readily obtainable when using other methods.

Schedule of time frames

TABLE 1.2: SCHEDULE OF TIME FRAMES

Task	Duration estimations
Literature study	2 months
Observation	2 days
Questionnaires	6 days
Final analysis and interpretation	3 months
Integrating results	1 month
Writing report	2 months

The sampling of people is essential for the survey where participants will be selected on the specific characteristics that make them the holders of informative data for the project of study (Maree, 2012). The community of Goedgevonden village were selected randomly with regard to their experiences and the farmers were included according to their different fields of farming, namely livestock and crop farming. The Ventersdorp Local Municipality and DAFF extension officers assisted with information where it was needed regarding statistics of farmers affected and the individual households affected.

1.9.2 Questionnaire and administration

The semi-structured questionnaires were used to conduct the study and endeavoured to build a conversation with the intention to discover the interviewees' ideas, views, beliefs and understanding regarding the problem in their territory. In order to gather the information, a minimum of five visits and consultations were organised for the purpose of an in-depth survey in the Goedgevonden village. The community, municipality and farmers were visited in this regard and the information was kept confidential.

Questionnaire type

The following types of questions can be included in a questionnaire:

- Closed questions are used for questions that are hard and of fast categories and are used in the beginning. Closed questions allow the respondent the chance to choose one or more response choices from many options provided (Strydom et al., 1998). The closed questions are contained in the questionnaire which makes it easy for the respondent to respond quickly to the answer (Strydom et al., 1998).
- Open questions give the respondent an opportunity to write about his feelings as he responds. As stated by Neuman (1997:279), this type of questions is good for the researcher to recognise how the respondent thinks regarding the questions.

- Ordinal questions are applied to allocate values to a number of aspects through arranging it in a particular manner of urgency, seriousness and significance.

The questionnaire in this research had the following as the three key questions:

- What were the socio-economic effects of the 2014/15 drought in the Goedgevonden village?
- What was the standing of the drought mitigation plan in 2014/15 in Goedgevonden and what is the current standing?
- Did the government do enough to support farmers during 2014/15 and what do the South African policy and practices say regarding mitigation?

1.9.3 Observation

It involved cross-checking of perceptions against what was observed in Goedgevonden by taking notes of the area and asking informal questions to some community members. The observation report assisted the researcher later when the results of the survey were analysed.

1.10 Data collection

The researcher gathers information through direct communication with the relevant individuals that possess the knowledge required by the researcher (De Vos et al., 2011). The various data collection methods that were applied included observation, questionnaires and site visits.

1.11 Data analysis and interpretation

According to Maree (2007:101), the process of interpretive analysis is looking at making sense of the explicit and implicit meaning of the collected data from narratives recorded during research. Analysing is where the researcher scrutinise an reduce the data to an intelligible and interpretable form so that research problems can be studied, tested and a conclusion drawn (Maree, 2007:101). The raw data is then analysed to simplify its information. The data collected regarding the Goedgevonden village were looked at, examined and made understandable and interpreted. The final report on the socio-economic impact of drought and recommendations will be presented to the community to adopt what is best for Goedgevonden.

The majority of the results and recommendations will be demonstrated in the content of the survey, while discussions and analysis of collected information will be critically examined to come up with alternative solutions to Goedgevonden village.

1.12 Ethical consideration

The participants were made aware of the questionnaire process before conduction, and the significance of confidentiality were explained to them. As stated by Creswell (2003:74), participants have the right to participate voluntarily and the right to withdraw at any time, which indicate that they are not forced into participation. The study had to require ethical application approval from the University of the Free State preceding undertaking the survey.

Participants have the right to know the significance of the survey so that they understand the nature of research and its likely impact on them. The researcher needs to consider ethics on the basis of social science. Whatever engagement the participants are put in, consideration should be the priority as not to destroy them mentally.

Their socio-economic backgrounds may play a certain role in making them respond to the interview as the drought impact might have caused damage in their minds, and taking them back into that process might retrieve negative thoughts which will put them in trauma. Some respondents might not have gone through a counselling process due to financial constraints and this might bring sadness back into their mind, resulting in negative impact (Wassenaar, 2006:60).

1.13 Limitations

Some respondents were reluctant to provide information while others failed to honour the appointment dates and time. In administering a questionnaire, total honesty from the respondents may not be gained. Some farmers were not cooperative which made it difficult to do data collection, while others were afraid to work with strangers. Hostile behaviour might have had an impact on the time allocated to the survey.

1.14 Delimitations

The study survey focussed only on socio-economic drought in the Goedgevonden village within the Ventersdorp Local Municipality which falls under Dr Kenneth Kaunda District Municipality in the North West Province of South Africa. The emphasis of the study was solely on social and economic impacts of drought in 2014/15.

1.15 Conclusion

This chapter summarised the structure of the study and reported on the preliminary literature study that showed the shaping of the survey question and the assessment on the impact of the drought on the social and economic aspects of Goedgevonden village in the North West Province. The chapter outlined the background, problem statement and the significance of the

study. It indicated the aims of the study and the research methods that need to be followed in the Goedgevonden village.

The chapter introduced the DFID model that deals with livelihoods vulnerability context and other components, although these will be thoroughly unpacked in the next chapter. The study laid the foundation for the role of the provincial disaster management plan in drought preparedness measures that deals with disaster risk reduction and mitigation. The focus was on how different countries applied various strategies to deal with drought with the aim of applying the suitable plan for Goedgevonden village as area of study.

The study is structured according to six chapters:

Chapter 1 offers the background of the study and addresses the research questions objectives and research methodology.

Chapter 2 presents the literature study on drought types, causes of drought, drought impact and sustainable livelihoods framework.

Chapter 3 explores the legislation and policy aim at addressing disaster risk reduction in South Africa.

Chapter 4 reflects on the methodology of the study and questionnaire as a tool applied to collect data.

Chapter 5 presents the data presentation, interpretation and analysis from graphs and tables.

Chapter 6 reflects on recommendations to mitigate drought impacts and provides a conclusion of the study of Goedgevonden village.

Chapter 2
Literature Study on Drought

2.1 Introduction

The objective of this chapter is to review the literature study concerning the research topic. The chapter first focuses on an explanation of drought, drought types and causes and vulnerability to drought, and then the impacts of drought around South Africa and other parts of the world. The chapter further looks at the vulnerability to drought by the society and economy, followed by the impacts of drought on both society and economy. The SLF model is explained in detail, emphasising its significance of assessing strategies that should be applied when faced with drought affecting livelihoods. Drought management and mitigation measures are discussed with the aim of discovering how other countries strived to deal with drought.

2.2 Drought

Wilhite and Buchanan-Smith (2005) suggested that drought is a natural hazard that is experienced when there is shortage of precipitation, while a normal period of precipitation is experienced

The prominent crucial lesson, though, is noticing that drought is not solely a shortage of rain, but it is explained by its impacts that are direct such as on crop shortage, and indirect such as on the rise in food prices (Glantz et al., 1997).

> *Drought is the conditions of climate dryness that is severe enough to reduce soil moisture and water levels below the minimum necessary for sustaining plant, animals, and economic system* (National Disaster Management Centre [NDMC], 2010).

According to the UNISDR (2012:11), the effects of drought are multiplied by climate change and human vulnerability such as poverty, over-usage of water resources, the poor maintenance of infrastructure and water supplies, insufficient restrictions on water usage, overgrazing and deforestation. As stated by Van Zyl (2006) drought is shortage of precipitation over a certain extended period which can be a season or more, resulting in water deficiency causing adverse conditions on vegetation, people, animals and environment within a territory of geographical space.

Hazelton et al. (1994:3) argued that drought can be defined as a situation leading to reduction of utilisable water resources in a particular area to the extent that the society does not have enough access to water resources.

Wilhite & Buchanan-Smith (2005) stated that drought, in general, is a condition of limited rainfall availability that is lower than the requirements of the society in a specific geographical extent and lower than the society's ability to sustain the shortage without damage to their agricultural output (crops and livestock), as well as the excessive expenses to recuperate.

Droughts are found to have many aspects and have complex ways that have fundamental mechanisms which is made up of biophysical and socio-economic factors (Wilhite, 2000). Since the twentieth century, drought has been occurring in South Africa on a regular basis where 70% of the normal rainfall has constituted meteorological drought (Vogel, 1995). South Africa experienced years of serious drought during 1991/92, 1997/98 and 2001/02 (Mason and Tyson, 2000).

2.2.1 Drought types

Drought has an effect on society, the economy and the environment, though it is not difficult to identify and quantify the impact of the drought (Austin, 2008:7). The intensity of a drought is dependent on the period, intensity and geographic extent that include the needs as result of people's activities and vegetation on region's water availability (Wilhite, 2000).

As stated by Wilhite (2000:61), there are four main categories of droughts, namely meteorological, agricultural, hydrological and socio-economic.

2.2.1.1 Meteorological drought

Meteorological drought is explained on the basis of the extent of dryness, in relation to the normal or average amount of rain? and the duration of dry periods (Wilhite and Glantz, 1985:56). The meteorological drought should be seen as region-specific as the atmospheric conditions that bring in shortage of rain vary profoundly in different regions.

Hot weather and extreme sunny days are prominent characteristics of meteorological drought. In regions with all-year precipitation and a moist climate such as in England, Brazil and some of the states in the United States of America, this type of drought is measured by number of days. In areas such as Australia, West Africa and India drought is measured over longer periods of time, as the lack of rainfall in these countries is seen as normal (Wilhite and Glantz, 1985:56).

2.2.1.2 Agricultural drought

Agricultural drought links various characteristics of meteorological drought to agricultural impacts, looking on precipitation deficiency variance between real and potential evapotranspiration, soil-water deficits, and reduced groundwater or reservoir levels (The Ojos Negros Research Group, n.d.: Online). For a plant to grow, it depends on available weather conditions, the biological characteristics of the particular plant, physical and biological properties of the soil, and stage of growth. Shortage of topsoil moisture during cultivation may disturb germination which results into low production. The required information to assess agricultural drought are fertility, soil texture, soil moisture, crop water requirements, pests, crop type, area and climate (The Ojos Negros Research Group, n.d.: Online).

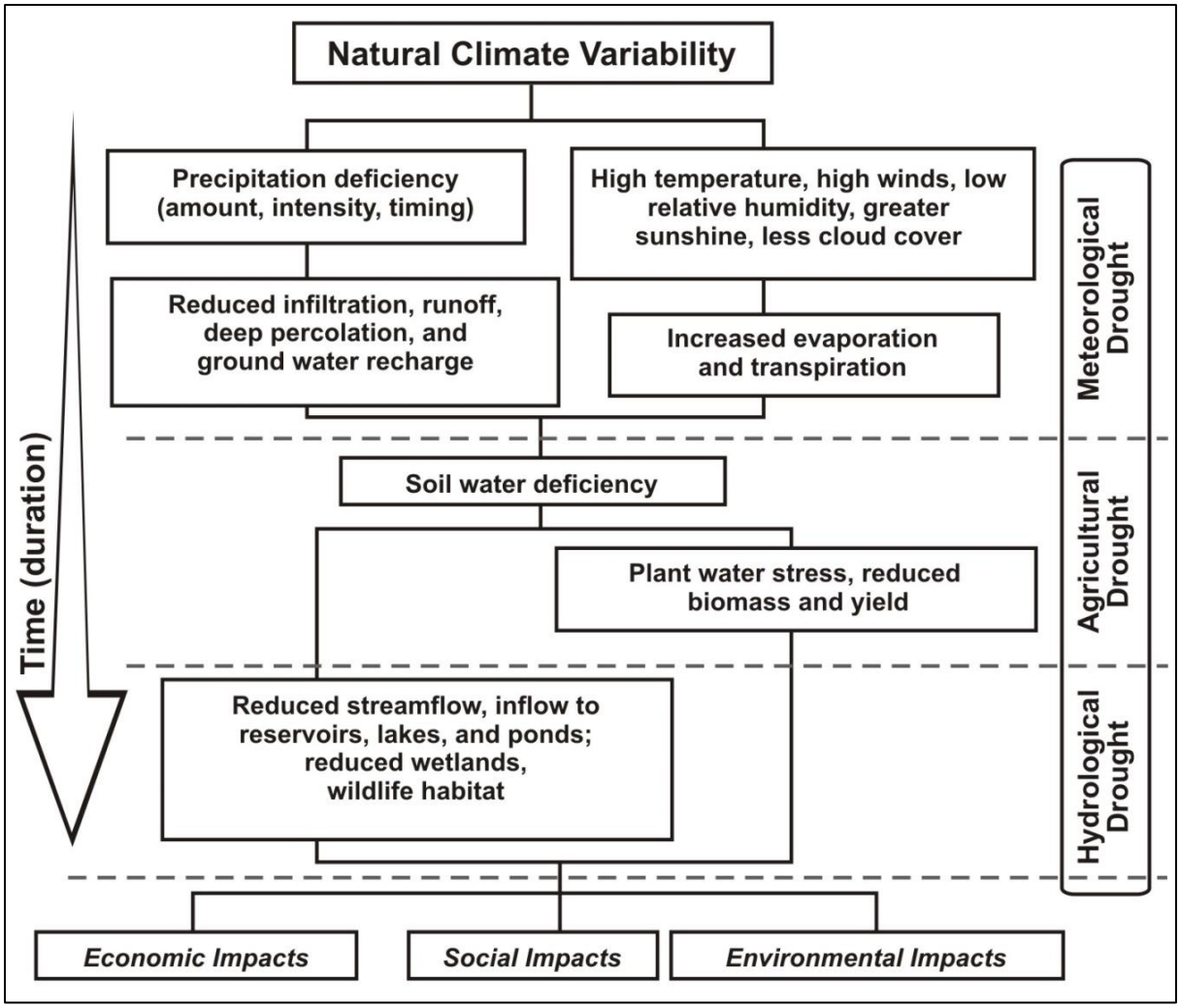
2.2.1.3 Hydrological drought

Hydrological drought refers to insistent low discharge or volume of water in streams and reservoir lasting for months or years (The Ojos Negros Research Group, n.d.: Online). It is a natural phenomenon but it may be eased by human activities. These are related to meteorological droughts and the frequency interval differs accordingly. The magnitude in the manner and the recurrence of hydrological drought can be attributed by the changes in the way the land is utilised. Data sets needed to assess hydrological drought includes surface runoff, surface water and volume, streamflow measurements, infiltration, water table fluctuations and aquifer (permeable rock) limitations.

Figure 2.1 shows the flow chart of different drought types and the relationship between meteorological, agricultural and hydrological drought types.

2.2.1.4 Socio-economic drought

Socio-economic definitions of drought associate the supply and demand of some economic goods with elements of meteorological, hydrological and agricultural drought (The Ojos Negros Research Group, n.d.: Online). It varies from other types of drought because its existence relies on the process of supply and demand. The weather is responsible for supply of economic goods such as water, fish, forage, food grains and hydroelectric power. Because of climate change, the water supply is not as consistent as in some years and it is found to be insufficient to meet human and environmental needs (The Ojos Negros Research Group, n.d.: Online).



Source: Wilhite (2000:10)

Figure 2.1: Flow chart showing drought progression and the relationship between meteorological, agricultural and hydrological drought types

Weather-related shortfalls in water supply result in economic goods requirements that exceed the supply. Drought may cause reduced hydroelectric power production, as power plants rely on streamflow for power generation. The absence of hydroelectric power production will put strain on government to change to more expensive petroleum alternatives and to put restriction orders on energy conservation in order to meet the demand for power (The Ojos Negros Research Group, n.d.: Online).

The rapid population increase leads to high demands for economic development. Increased production efficiency may be triggered by an increase in the supply. Supply and demand increase their relative rate of change; therefore, the socio-economic type of drought is promoted when the demand for water in economic activities far surpasses the supply (The Ojos Negros Research Group, n.d.: Online). Data sets required to assess socio-economic

drought are human and animal population, growth rate, water and fodder requirements, severity of crop failure, and industry type and water requirements.

2.2.2 Causes of drought

According to Mason (1996:47), South Africa has rainfall variability based on the climate that has both wet and dry weather conditions. During El Niño, more than 30% of precipitation variability is experienced around Southern Africa (Mason and Tyson, 2000:47). El Niño increases the impact of warm weather events such as heat waves that result in the increase of drought occurrence around Southern Africa. The occurrence in the South Pacific Ocean changes the temperature, pressure and wind fields over Southern Africa.

Varying conditions are produced during a high phase of El Niño−Southern Oscillation (ENSO) as well as low phases (Tyson and Preston-Whyte, 2000). The low phases of Southern Oscillation make the convergence zone of cloud bands to move offshore and the convergence zone is the source of rainfall (Tyson and Preston-Whyte, 2000). The ENSO warm event is usually associated with drought over the Southern African continent, especially in the south-eastern parts (Mason and Tyson, 2000:47).

The global drought as result of ENSO may notably change developing countries' access to food from the benefactor countries (Mason and Tyson, 2000:47). These countries need drought management that will use all aspects of climate change by not relying solely on ENSO-related variations on precipitation (Reason et al., 2005; Wilhite, 2000). It was estimated that there is a greater than 120% rise in the expectations of drought disaster at the start of any El Niño period, which means that the Southern African region is having a frequency of drought events (Thompson et al., 2003). More emphasis should be put on the vulnerabilities that South African societies face regarding drought conditions.

2.3 Vulnerability to drought

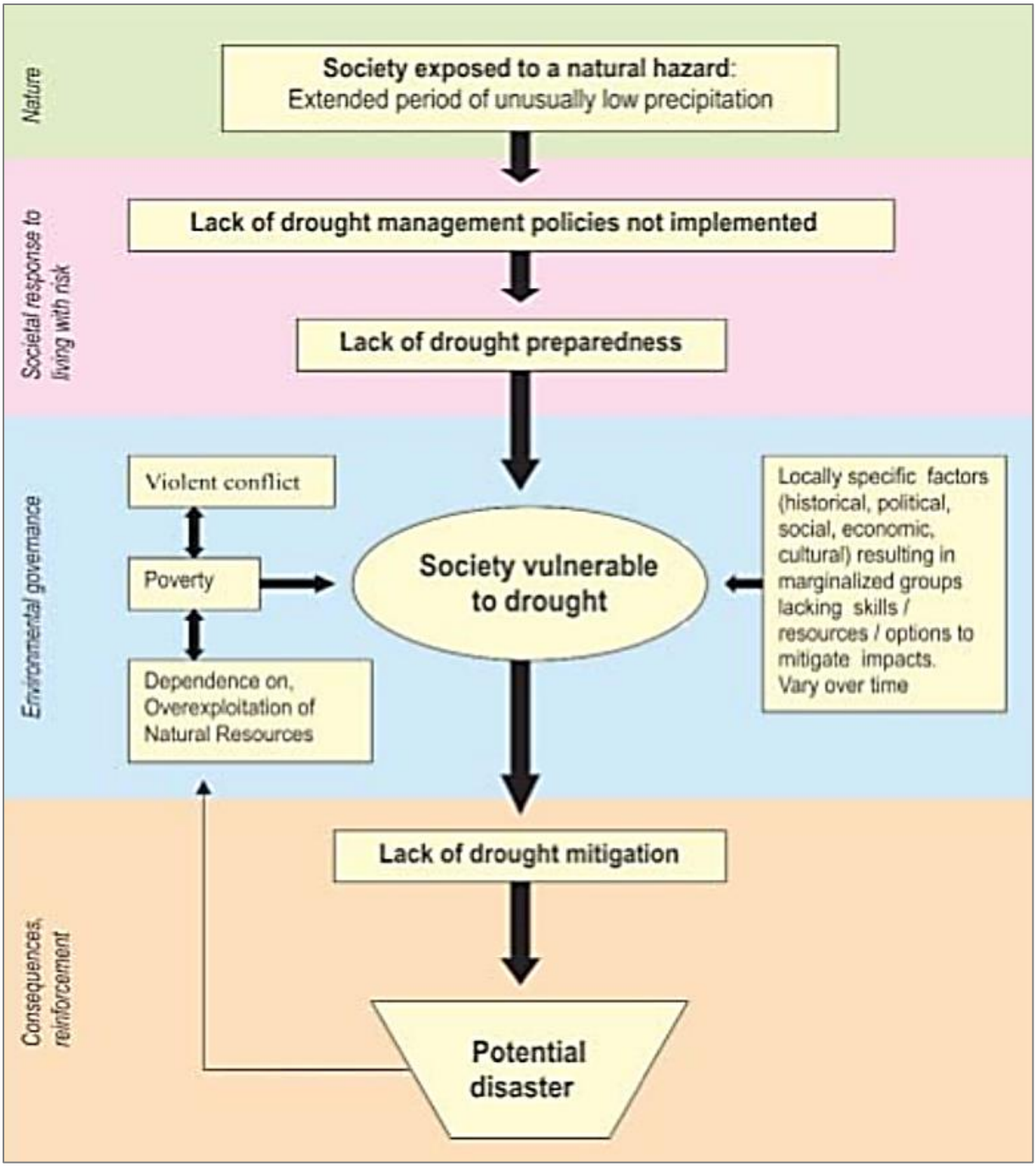
In assessing the disaster risk, the social production of vulnerability needs to be considered with at least the same degree of significance that is dedicated to understanding and addressing natural hazards (Wisner et al., 2003:49). The risk of disaster is a multiple function that involves natural hazards, community members that have various degrees of variability to a particular hazard, and occupying the same space and time of exposure to hazardous condition (Wisner et al., 2003:49).

The definition of vulnerability states that vulnerability is the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process) (Wisner et al., 2003:11).

Individuals, communities or government can be exposed to aggravated vulnerabilities that could be caused by the drought as a natural hazard (Sear et al., 1999). Risk relies on the mixture of the regularity and rigorousness of the hazard and the vulnerability of the people exposed to it (Vogel, 1998). Vogel (1998) further argued that the more exposed the community is to the hazard; the more the economic expenditure and physical reconstruction are needed for the hazard. In order to understand the community's vulnerability, it is vital to know the geographic, historic and socio-economic influences the community is exposed to (Vogel, 1998).

The UNISDR (2009), in their report on drought, highlighted the fact that communities can be vulnerable to drought because they lack the following: drought management policies, implementation of policies, and drought preparedness measures. It also includes other factors such as underlying poverty, undeserving situations, violent conflicts, society dependence on over-exploitation of natural resources and shortage of skills to mitigate the drought situations (UNISDR, 2009). Figure 2.2 indicates how the society is exposed to natural hazards if it lacks drought management policies, drought preparedness and drought mitigation plan. As Wilhite (2000:64) stated, a complete understanding of the community is mandatory to understand the level of vulnerability to a drought event within that particular community. Some communities are liable to destruction and loss in the face of different disasters, the variations in impacts could be as a result of differences from wealth, health, disability, age, type of social networks, gender or ethnicity (Dercon, 2002).

Drought and vulnerability are interrelated in the sense that drought may cause moisture shortage which may result in a fall in crop production and livestock deaths in an affected area. The rich farmer may suffer loss of more livestock in terms of quantity such as 12 out of 50 animals but they would still have livestock left for restocking in future. In the case of a poor subsistence farmer, he may lose all five of his livestock and will have nothing to sustain him in the event of drought. On the other hand, the rich farmer has alternative measures such as that of taking livestock for relief grazing during drought, whilst the poor subsistence farmer remains without alternatives and his operations will face a serious blow. This indicates that the impact of drought is more serious on the poor than on the rich, as the rich farmer has alternative resources that will sustain him such as insurance and savings, while the subsistence farmer will be depleted with no alternative resources left.



Source: UNISDR (2009:15)

Figure 2.2: Drought-vulnerable society

2.4 Drought impacts

Drought is a major feature of climate in Southern Africa and has a devastating impact where the root causes are low average rainfall, poverty and inequitable development (RSA NDA, 2005b). Of the 415 drought disasters that occurred in the period 1970−2003, approximately 1.5 billion people were seriously affected globally (Kellet and Sparks, 2012:23). Economic

losses were estimated at $76 949 488 000, and 555 000 people died in the Sahel region in Africa (Kellet and Sparks, 2012:23; UNISDR, 2007).

Globally, it has been stated that disasters such as drought has caused more socially significant and irreparable destruction in poor countries where the poorest and vulnerable communities feel the severe impact as explained by the Economic Commission for Latin America and Caribbean (ECLAC, 2003). In the rich countries, there is prominent mitigation and protection against disasters because of technological know-how and the vulnerability reduction measures applied.

The impact of drought can be local or regional which makes it difficult to measure its impact in different sectors (Wu and Wilhite, 2004). Drought can last for a longer time (a year) or shorter time (weeks) depending on the climate conditions at the time. The impact of drought could be direct or indirect or are allocated by order of spreading (Coleen et al., 2006). In communities where agriculture is the main economic activity, the impact is seen in the form of reduction in food production, reduced water levels, increased livestock and wildlife deaths, rise in veldfires and death of fish (Coleen et al., 2006).

The impacts of drought include social, economic, and environmental impacts on communities (United Nations Development Programme [UNDP], 2010). These drought impacts are discussed below.

2.4.1 Social impacts

Drought impact is found to be direct or indirect and the direct effects lead to reduction in crop production and high levels of water shortage coupled with the rise in livestock mortality rates (Svoboda et al., 2002:1187). The increase in food prices, the high unemployment rates, and lower income for farmers are the examples of indirect influences (Folger et al., 2012).

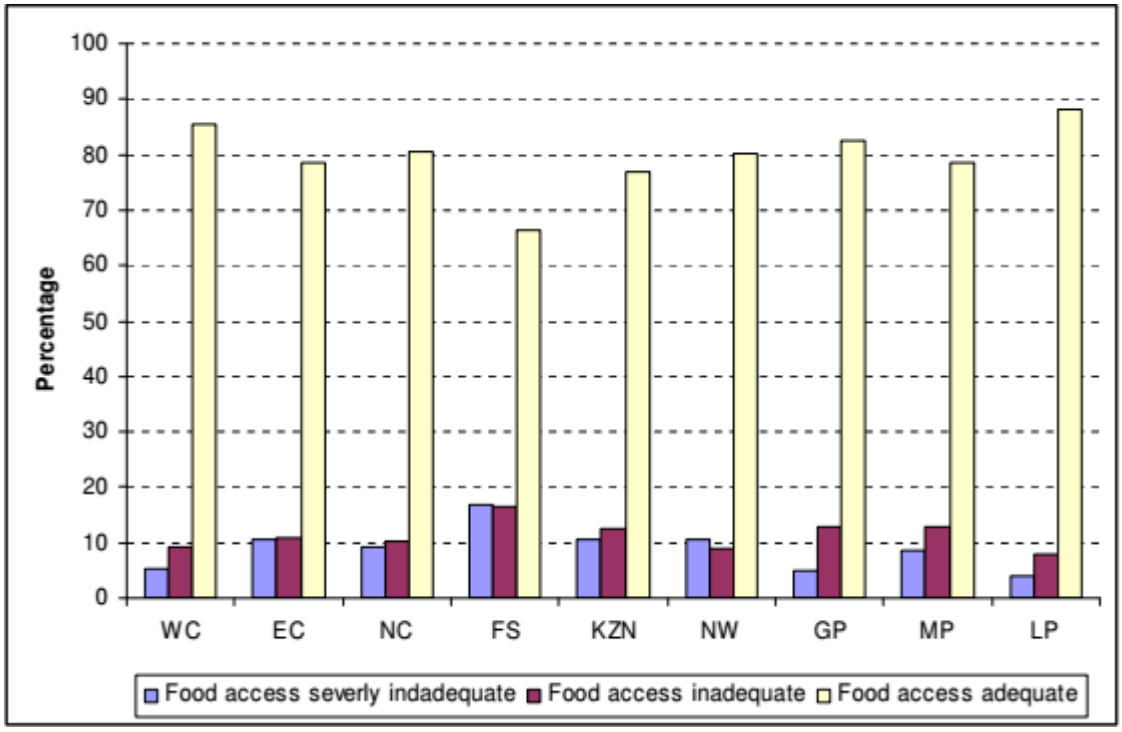
In the early 1990s, there was a shortage of water supply in rural areas and subsequently, there was inadequate supply of food (Vogel et al., 2000:351). The situation led to reduced income, food shortages, radical price hikes and a decline in soil fertility, leading to reduced crop production (Vogel et al., 2000:351). The normal activities of the society that relies on natural environment such as water for food production and livelihoods can be altered negatively by a drought event. Vogel et al. (2000:351) further pointed out that the drought impact on society may take a longer time than expected even if the incident of drought has stopped, leading to food insecurity and food price hikes.

2.4.1.1 Food security

Food security is defined as conditions where in a society all people all the time have enough food for an active and healthy life (United States Department of Agriculture, 2011). The term 'food security' includes availability of food that is nutritious and safe, an assured ability to obtain and acquire food of good quality in a socially acceptable way (without resorting to emergency food supplies, scavenging, stealing or similar coping strategies).

South Africa is found to be a food secure country with enough staple food or being able to import food if needed in order to meet the basic nutritional needs of the population (Food and Agricultural Organization [FAO], 2008). This argument was reinforced by Aliber and Hart (2009) as they shared sentiments that South Africa appears to be food secured at national level although that cannot be said when referring to households in rural areas. It was stated by Aliber (2009:10) that about 20% of South African households have insufficient food access. The General Households report, as stated by Aliber (2009:10), reflected that during the period of 2008, food access challenges were typically severe in the Free State Province as 33,5% of the households had insufficient food access, followed by KwaZulu-Natal with 23%, Eastern Cape 21,4% and Mpumalanga 21,5%. The provinces of Limpopo and Western Cape had the least food security of 11, 9% and 14,5%, respectively in the year 2008. Approximations by Stats SA (2009) reflected that South Africa had an estimated population of 49 million in 2009 with a population growth rate of 1, 7% per year. The national food security indicators publicised that South Africa has been able to meet the food needs of its growing population over past years.

It has been realised that even when there is food availability on the markets in South Africa, some households are not able to access it (Stats SA, 2009). Even after 20 years of democracy in South Africa the majority of people are still struggling to access quality and nutritious sufficient food. Figure 2.3 indicates some of the trends over the years 2002 to 2008 on food adequacy in nine provinces in South Africa.



Source: Stats SA, General household survey (2009)

Figure 2.3: Trends of household food adequacy for South Africa over the period 2002−2008

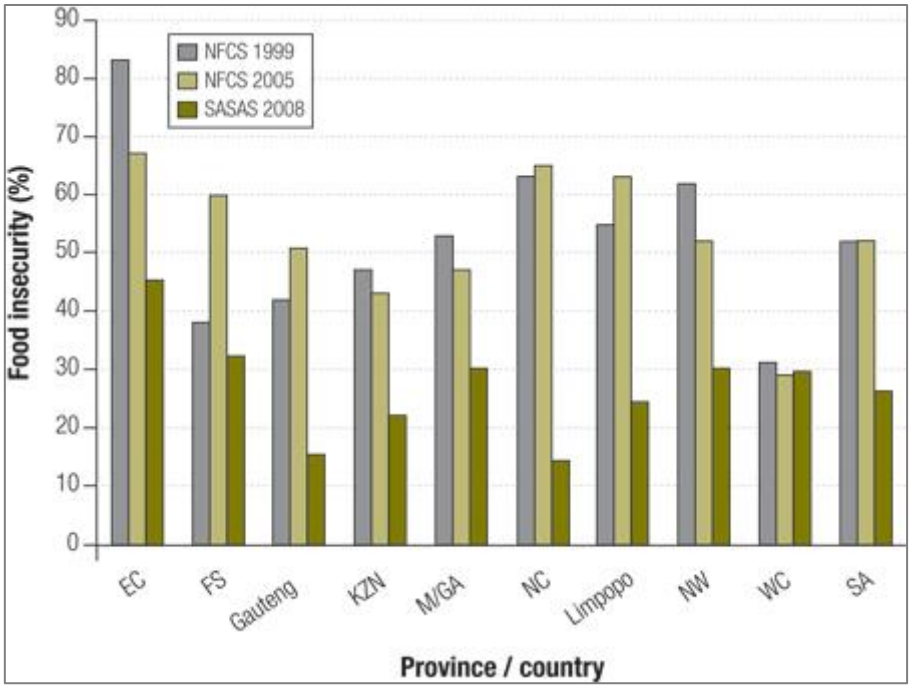
The government of South Africa has embarked on the National School Nutrition Programme which aimed to provide meals to the neediest learners. The programme was introduced in 1994 for primary schools and secondary schools were included in 2008 (RSA Department of Education, 2009). The intention was to make sure that all needy learners in public schools have access to free meals during break time. The Department of Education, in conjunction with the Department of Health, provided menu options. In contradiction, food insecurity exists when food is not accessible and people have difficulty to access adequate quality food, therefore this aspect is discussed below.

2.4.1.2 Food insecurity

Food insecurity is the incapability of people to access adequate healthy food for their needs (Vogel et al., 2000:351). Many South African people are plagued by continued food insecurity that leads to malnutrition and unemployment where about 14.3 million being vulnerable at any given time (RSA NDA, 2003). There are many compounding issues that led to food insecurity in South Africa which were worsened by the drought and increased people's vulnerability (Vogel et al., 2000:351).

Figure 2.4 reflects the data on food insecurity from 1999 to 2008. It shows the drastic drop in food insecurity from 1999 to 2008. The scenario from the data is changed presently as the

result of El Niño event that has plagued South Africa since 2014. The event has brought drought leading to a rise in food insecurity among societies.



Source: Food insecurity?

Figure 2.4: Food insecurity at the provincial and national levels in South Africa according to three national surveys spanning 1999–2008

The bigger domestic production of food is significant in curbing food insecurity within a particular area. In the conditions where drought brings a decline in food output, there is need that early warning indications reflect the information on food supply and demand (Muchinda, 1999). The information of this nature is essential in support of government, relief agencies and donors to have an informed plan for humanitarian aid. In some areas, the farmers were not producing much food as they fear high input costs of pest control due to drought. In some instances, farmers retained their maize production for local consumption as they feared the future uncertainties and food price fluctuations. They also resorted to diversifying their production to comprise alternative food and cash crops. In situations where the country is plagued by drought phenomenon, and food production is low, there is need for early warning signs that deliver information on food demand and the need for supply (Muchinda, 1999).

Table 2.1 shows the summary of social impacts and the effects of drought.

TABLE 2.1: SUMMARY OF SOCIAL IMPACTS AND THE EFFECTS OF DROUGHT

Social impacts	Effects
Lack or poor distribution of resources (food and water)	Migration, resettlement, conflict between water users
Increased quest for water	Increased conflicts among water users
Marginal lands becoming unstable	Poverty and unemployment
Reduced grazing quality and crop yield	Overstocking; reduced quality of living
Employment lay-offs	Reduced or no income
Food insecurity	Malnutrition and farming; civil strikes and conflict
Increased pollutant concentration	Public health risks
Inequitable drought relief	Social unrest and distrust
Increased forest and range fires	Increased threats to human and animal life
Urbanisation	Social pressure and reduced safety

Source: Coleen et al. (2006)

2.4.2 Economic impacts

The other drought impact is on the economy where there are negative implications for this sector because of persistent water shortages. The maize farming industry needs enough water for growing; if there is a shortage of water this results in high food prices. The prices on basic food will increase, especially for maize meal, stamp, wheat, vegetables, chicken and beef as stated by Agri SA (Mapumulo, 2016: Online). Maize, vegetables and meat production are seen as the worst hit by drought and are the staple foods for most South Africans. Drought has affected the country to the extent that the farmers had to increase the number of livestock to be slaughtered as it was taxing to feed the cattle. The monthly survey done by the Pietermaritzburg Agency for Community Social Action has indicated a price increase over a three-month period with an all-time high of 15% per basket of 36 kinds of basic foods (Mapumulo, 2016: Online). The rise of prices during periods of drought leads to malnutrition and hunger on the side of the low-income groups whose financial standing is low to afford escalating food prices (Chabane, 2004).

The rising food prices, coupled with 16,6% rise in electricity tariffs, the rise in water tariffs, interest rates, and the high level of indebtedness may impact disastrous to the South African society (Mapumulo, 2016: Online). The Government's intervention should control the price fluctuations, as this is frequently done in the developed countries due to fluctuating apicultural markets (Chabane, 2004).

The *City Press* (Tau, 2016: Online) told the story of a 77-year old subsistence farmer in the North West Province, who was one of the many who suffered from the agony of the drought. She lost more than half of her herd of 21 cattle in three weeks, and her neighbour lost 12 cattle in December 2015 due to the drought (Tau, 2016: Online). Table 2.2 summarises the economic impact and the effects of drought.

TABLE 2.2: ECONOMIC IMPACTS

Economic impacts	Effects
Reduced business with retailers	Increased prices for farming commodities
Food and energy shortages	Drastic price increase; expensive import/subsidies
Loss of crops for food and income	Increased expense of buying foods from shops
Reduction of livestock quality	Sale of livestock at reduced market prices
Water scarcity	Increased food cost
Loss of jobs, income and property	Deepening poverty; unemployment
Less income from tourism and recreation	Increased capital shortfall
Forced financial loans	Increased debt; increased credits for financial institution

Source: Coleen et al. (2006)

2.4.3 Environmental impacts

The drought impact has a negative bearing on the environment which comprises of vegetation, agriculture, bushes and soil. The land degradation, soil erosion and loss of quality water and land, are results of drought (Fafchamps et al., 1998).

The NDMC (2010) has provided the following as environmental impacts: damage to animal species, hydrological effects, and damage to plant community which are explained below.

- **Damage to animal species**: The lack of feed and drinking water results in greater mortality of animals and fish, while life becomes degraded. Diseases will affect animals resulting in deaths. Increased vulnerability to predation will be common as some wild animals will have to concentrate near available water sources.
- **Hydrological effects**: There will be lower water levels in reservoirs, lakes and dams which result in reduced flow of water from springs and the water table. The perennial rivers will be dry and there will be a loss of essential wetlands which regulate, control and provide a habitat for birds and fish.
- **Damage to plant community**: The biodiversity will be lost due water shortage. Trees will be lost and wind and water erosion will result in reduced soil quality. Some plant species will be lost where dongas will be caused on the land surface.

The impacts of drought on the environment differ, as there are those who last long in the post-drought stage, while others take a short time to rehabilitate. According to Batisani (2011:805), Botswana prefers to provide societies with humanitarian assistance instead of planning and developing policies on mitigating environmental impacts. This is not the solution as drought spells are not predictable, as some effects may become permanent even after drought-coping measures (Fafchamps et al., 1998:274, Vogel et al., 2000:346).

Highly intense droughts can result in land degradation that decreases agricultural land production which impact on both economy and the livelihoods of affected communities (Vogel et al., 2000). Destroyed land results in some species to die, while others hibernate to other areas which leads to shortage of biodiversity. Table 2.3 summarises the environmental impact and the effects of drought.

TABLE 2.3: ENVIRONMENT IMPACTS

Environmental impacts	Effects
Damage to natural habitats	Loss of biodiversity
Reduced forests, crop, and range land productivity	Reduced income and food shortages
Reduced water levels	Lower accessibility to water
Reduced cloud cover	Plant scorching
Increased day-time temperatures	Increased fire hazards
Increased evapotranspiration	Crop withering and drying
More dust and sand storms	Increased soil erosion and increased air pollution
Decreased soil productivity	Desertification and soil degradation (topsoil erosion)
Decreased water resources	Lack of feeding and drinking water
Reduced water quality	More waterborne disease; increased salt concentration
Increased incidences of animal diseases and mortality	Loss of income and food; reduced breeding stock
Soil desiccation	Increased soil 'blow activities'
Degradation of landscape quality	Permanent loss of biological productivity of the landscape
Species concentration near water	Increased vulnerability to predation

Source: Coleen et al. (2006).

2.4.4 Effects on agriculture

The effects of drought can bring about undesirable consequences on agriculture as an industry. Several types of farmers, such as commercial, communal, subsistence and small-scale farmers, fall under agricultural types (Reynolds et al., 2001:58). The difference between the above-mentioned farmers is that the commercial farmer produces for the market and trade, while the subsistence farmer produces for himself and supports his family with income coming from trading of crops in nearby areas (Reynolds et al., 2001:58). The subsistence farmers are mostly impacted by drought events than commercial farmers as many are often coming from the previously disregarded societies. The subsistence farmers might not have the opportunities to produce for the larger markets as their operations basically focus on food security provision and diversifying their household income (Reynolds et al., 2001:58).

Due to the fact that the subsistence farmers have limited resources and capital, they are susceptible to drought as they rely on their output for food security and material profit. The commercial farmers are better equipped as they have financial resources and security such

as insurance to keep them going during droughts (Reynolds et al., 2001:58). Mostly, the commercial farmers have structures such as associations, which are essential in the provision of information pertaining to their challenges such as disasters. The segments that follow scrutinise the effects of drought on agricultural activities such as livestock and crop production.

2.4.4.1 Livestock mortality and malnutrition in animals

Scoones et al. (1996:284) believed that in some contexts farmers prefer to relocate their livestock to other areas that have sufficient pastures as a result of reduced fodder production. The same is not possible to the subsistence farmers. Farmers should have more workforce to enable them to move their livestock to other grazing places and this requires more earnings to remunerate them (FAO, 2010:26). The general effect of a total weakening in pasture and crop production reduces the ability of the farming sector to operate, which leads to lower crop production in the following farming season (Scoones et al., 1996).

2.4.4.2 Unplanned sales of livestock and purchase of grain

Heathcote (1969) indicated that drought can result in agricultural agony sales when losses of livestock increase in the affected area. The agony of sales comes along with reduced prices for livestock to minimise the loss of stock due to a high death rate in animals. This indicates that farmers endure a serious financial loss as related to normal sales without drought-induced effects (Scoones et al., 1996:285). There are conditions that force farmers to sell their livestock so that they can buy food, especially during the periods when drought has tormented in a specific area or region for longer periods of time (FAO, 2009:10). Situations such as these induce farmers to sell their livestock that has minimal contribution to farm development such as goat and sheep. As the drought persists in poor countries, farmers usually resorted in selling even the most usable livestock such as herds and donkeys which are used as transport (FAO, 2009:10).

The financial instability of households relying on agriculture can be associated with drought (Mortimore and Adams, 2000:50). As much as circumstances can vary per household, capital is determined based on possessions, extra income from other sources and the degree to which these resources are less affected by drought than crop production and livestock (Mortimore and Adams, 2000:50). The households that are mostly vulnerable to drought are those who own fewer assets. Some rich households can benefit from drought event as they gain land and other resources at reduced prices from distress sales by the disadvantaged households (Mortimore and Adams, 2000:50). Some households have no access to food, even if they have extra income sources during droughts. It is eminent that during drought, household livelihoods are vulnerable and the more vulnerable the household is, the more

serious the household will be affected by the adverse impacts of drought. It is evident that the FAO (2009) and Mortimore and Adams (2000) support each other on the argument that there is income loss and negative impact on livelihoods during drought. Both the rich and poor farmers suffer stock and financial losses although the rich farmers get insurance relieve.

2.4.4.3 Reduced dung production

Animal dung is seen as important for natural use such as fuel for firewood and as fertiliser for crops (Scoones et al., 1996:284). Dung is used as commodity to fertilise the fields so as to increase production and it also allows larger fields in dry areas to accelerate the growing of various crops (FAO, 2010:26). It becomes evident that when small-scale farmers and subsistence farmers experience loss of livestock, they also loose production of dung which subsequently affects the community negatively. As stated by the FAO (2010:26), the significance of dung can be attributed as per area, because it differs between different farming systems based on various factors. Dung is estimated to be the second most significant product gained from livestock (Gryseels and Anderson, 1983).

2.4.4.4 Out-migration to diversify income sources

This is reflected when farmers reduce the number of farm workers as result of low crop production (Horridge et al., 2003). The decrease in farm workers minimises the amount of household food availability for either the farmers or the farm workers or both (Horridge et al., 2003). In other instances, there is migration of individual farm workers during the drought period from rural areas to urban areas in search of work. This movement has some consequences as those who find jobs away from home become separated with their loved ones and sometimes it becomes difficult to send money home, resulting in livelihoods challenges (FAO, 2010:26). Those who left at home will have to remain without food to feed their families until the subsequent harvest season. The effects of drought have serious implications for the farm households for many years, but in the historical knowledge different countries and regions have developed measures to mitigate the drought situations (Horridge et al., 2003).

2.4.4.5 Reduced crop production

Poor distribution of rainfall leads to poor quality of crop production. Farmers often harvest a limited number of crops during the drought event than expected to enable them to feed their household (FAO, 2009:10). They are often compelled to sell their crops at low prices to other community members and search work somewhere else in order to earn income. According to Gryseels and Anderson, 1983) this is associated with distress sales as the farmers sell crops

at reduced prices, which subsequently incur substantial financial loss compared to sales under normal circumstances. The subsistence farmers are the ones who are more vulnerable to drought as they rely mostly on agricultural production for food and livelihoods (Scoones et al., 1996:284). The commercial farmers are more resilient than subsistence farmers as they have associations that provide vital frequent information and have financial muscles that are coupled with insurance to alleviate the drought epidemics (FAO, 2009:10). The richest members of the community are the ones who benefit during drought because they acquire land and other assets at low prices from distress sales by poor farmer neighbours (Wolde, 1984).

2.4.4.6 Decreased fodder supply

As stated by the FAO (2010:26), once there is serious drought and crops are severely affected, the fodder production is minimised. Scoones et al. (1996:284) agreed that reduced precipitation leads to reduced pasture development as result of disturbed crop production, and the supply of fodder will therefore remain low.

The following section discusses how drought can affect livelihoods and means to develop resilience in societies.

2.4.5 Drought impact in South Africa

South Africa has experienced frequent drought in recent decades as stated in Chapter 1. Around 1992 and 1993 the major impacts were felt as maize had to be imported into the country (Van Zyl, 2006:78). The country did not have enough maize and the effect of drought events led to crop failure, which was noticed. Many people fled their rural places to the urban areas; this resulted in closure of farms and farm labour lay-offs as well as increased agricultural debts (Van Zyl, 2006:78).

The country was hit by severe veld-fires that destroyed large cultivation, grazing land for livestock as result of the drought phenomenon. During the period 1992 to 1994, strong winds destroyed hundreds of hectares of land, and as a result this devastating wind caused veldfires (Van Zyl, 2006:78). Below are some examples of impacts as result of drought in South Africa:

- Grain sorghum production dropped by 95 000 tons from production of 283 000 tons annually during 2003 and 2004 (Van Zyl, 2006).
- Estimated 50 000 to 70 000 jobs were lost as result of the drop in crop production for commercial farmers to sell to markets during 2006 to 2008 (NDMC, 2010).

2.5 Sustainable livelihoods framework

The SLF reflects on how the sustainable livelihood can be applied to assess the livelihoods strategies employed by community of Goedgevonden in dealing with a drought disaster. The SLF is an instrument to enhance comprehension of livelihoods, specifically of the disadvantaged poor (UK DFID, 1999:1). Ashley and Carney (1999:4) share the same sentiments as they agreed that the SLF is based on the ideologies that are concerned with reduction of poverty. The framework endeavours to assist the participants with various viewpoints to deal with structures and articulate debates about the factors that affect livelihoods, their relative importance and the way in which they network (UK DFID, 1999).

The SLF does not try to supply a precise representation of reality; it attempts to come along with a way of thinking about the livelihoods of the poor and stimulation of debates and reflections on how to improve on poverty reduction (Chambers and Conway, 1991:296).

2.5.1 Definition of livelihood

As stated by Chamber and Conway (1991:296), the word 'livelihood' can be applied in many different ways and the following definition captures the broad notion of livelihoods:

> *A livelihood comprises the capabilities, assets (including resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future while not undermining the natural resource base.*

Carney (1998) issued a humble and brief definition of the word 'livelihood', taken from Chambers and Conway's definition:

> *A livelihood comprises the capabilities, assets (including both material and social) and activities required for a means of living.*

2.5.2 Vulnerability context

Vulnerability is considered as uncertainty in the well-being of people, households and communities in the face of fluctuations in their external environment (Serrat, 2008). On the other hand, Adato and Meinzen-Dick (2002:8) saw vulnerability context as the environment where households pursued their lives.

Soussan et al. (2000) agreed that vulnerability context refers to trends of change and variability in those factors that affect livelihoods and the structural processes that can materially disrupt different aspects of the livelihood process. Shocks can be seen as sudden changes in human health, natural environment, economic environment, conflicts and crop/livestock health situations (Soussan et al., 2000).

Politics and conflicts can be sources of vulnerability which is sometimes unfortunately neglected (UK DFID, 2000). When consulting the poor, it reflects that insecurity and vulnerability to physical violence, often at the hands of police or security forces or other structures of state authority, are found to be the key livelihood constraints. They contribute in making people vulnerable, for example, in urban perspective; the recurring existence of illegal settlement is regularly relying upon forced patronage relationships (UK DFID, 2000). In the rural perspective, the conflict over natural resources such as water, land, woodlands, fisheries, minerals, wild plants and animals, may result in making the livelihoods of certain groups very insecure (UK DFID, 2000).

The vulnerability context is made up of the following, according to Adato and Meinzen-Dick (2002:8):

- **Trends**: They are physical, natural, social and economic indicators such as unstable goods and food prices. Frequent ones include governance and demographic trends resulting from human movements (migrations).
- **Shocks**: These can be unusual changes in people's health, impacts of disasters such as economic changes, drought, floods, livestock demises, decline in crop production, and shortage of water as an essential resource for the agricultural industry.
- **Seasonality**: Seasonality can be in job opportunities, crop production and availability of resources or health or seasonality of prices.

The three facets – trends, shocks and seasonality – can have both a negative and positive impact on the community. Trends may decline in natural resources such as water, which can impact negatively on the growth of crops. Shocks could be seen as unpredicted events that have a negative effect on the livelihoods of the society. An example could be hazards such as drought which may occur unexpectedly and last longer, resulting in severe decline in crop production (Kollmair and Gamper, 2002:5). Lastly, seasonality could relate to the availability of job opportunities, as well as an increase in household income during a rainfall season as it brings higher crop yields. It is important to realise that the vulnerability context in the SLF lies beyond the control of stakeholders or the community as there are many external environmental components involved (Kollmair and Gamper, 2002:5).

2.5.3 Livelihoods assets

Livelihoods assets are concerned with people, where it tries to obtain a precise realistic understanding of human strength, that is assets or capital endowment, and how they try to convert these into a positive livelihoods outcome (UK DFID, 1999). Livelihood assets include

many activities that humans perform in order to access food and income, such as agricultural activities, livestock production, business activities or different types of employment they may engage in (Organisation for Economic Co-Operation and Development, 2001). On the other hand, Twig (2001) agreed with this view, but included strengths and capacities as another form of livelihoods assets.

People need an array of assets to attain outcomes that have positive livelihoods as there is no single category of assets that is good enough to provide all various livelihoods outcomes required by people (UK DFID, 1999). As a result, they need to search ways that must be fostered and combined in order to meet livelihoods outcomes that will ensure their survival. Livelihoods assets are not solely natural or biological (water, land, flora and fauna), but they are also social (family, community, social networks, human knowledge, human empowerment) and physical (which include schools, markets, hospitals, clinics, shops and roads) (Osman-Elasha et al., 2005).

Various types of capital may be utilised directly or indirectly with the aim of producing livelihoods, thereby bringing to life the significant interrelationship between various assets with the aim of poverty elimination (UK DFID, 1999). Disaster events may lead to unsustainable livelihoods; therefore, communities need to prepare, mitigate and avert the event by drafting and collaborating five types of capitals (Carney, 1998).

Adato and Meinzen-Dick (2002:9) suggested the following five dominant forms of livelihoods assets: human capital, social capital, physical capital, natural capital and financial capital arranged in a pentagon.

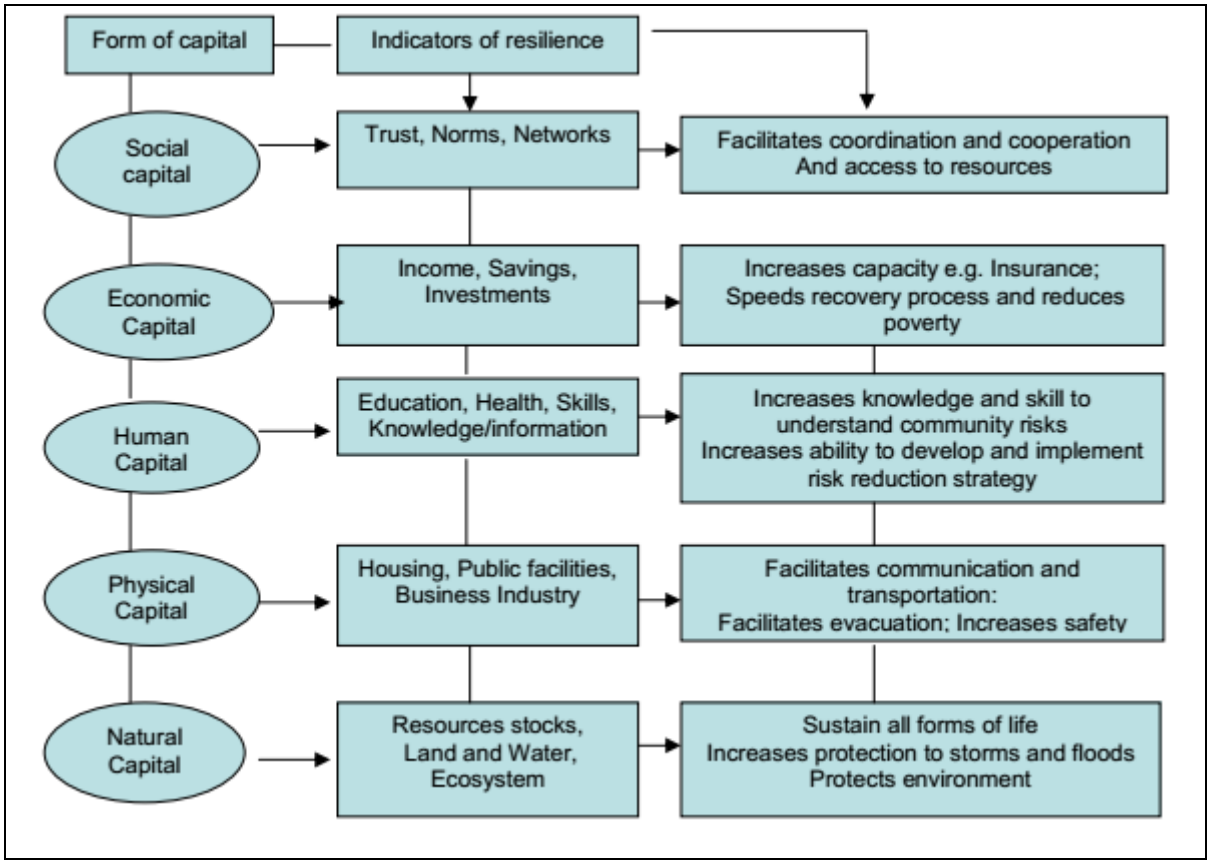
2.5.3.1 Human capital

Human capital involves the skills, knowledge, and capability to labour and good health that work together to enable people to advance livelihood strategies and achieve livelihoods purposes (UK DFID, 1999:7). Support to accumulate human capital is found to be direct (education, training, health, development of relevant knowledge and skills), or indirect (reform of training policies, reform of education, for example for women, changes in local institutions) (UK DFID, 1999). Human capital constitutes the quality and quantity of the workforce available, as human capital enables the people to pursue different livelihood strategies and achieve their objectives. Knowledge generation should be based on understanding the current livelihoods strategies of the poor and the internal and external factors that may bring positive changes. The knowledge generated must be relevant to existing or potential for the forthcoming livelihoods strategies (UK DFID, 1999:8).

2.5.3.2 Social capital

Social capital is considered to be social resources upon which people engage in search of their livelihoods objectives (UK DFID, 1999). Social capital includes features such as place of stay, age group and gender (Kollmair and Gamper, 2002:6). It may be considered positive or negative for the community because of procedures, rules or norms that are followed in order for a person to join a specific society. For example, a woman farmer may be restricted from joining a male-dominated farming group if the rules do not allow female farmers.

Social capital has a significant role as 'resource of last hope' as it can provide a buffer that assists a society to cope with blows such as death in the family, or acts as an informal safety net to ensure survival during periods of extreme uncertainty and reimburse for lack of other types of capital, for example compensating for limited human capital within the household (UK DFID, 1999:9). Figure 2.5 indicates all these forms.



Source: Mayunga (2009).

Figure 2.5: Major forms of capital

2.5.3.3 Physical capital

Physical capital is made by economic production that includes producer goods needed to support livelihoods and basic infrastructure (UK DFID, 1999). The producer goods are

instruments or equipment that are used by people to engage in production activities, while the infrastructure involves changes to the physical environment that assist people to achieve their basic needs and to be more productive (George, 1997). These are made up of affordable transport, secure shelters and buildings, adequate water supply and sanitation, access to information (communication) and clean, affordable energy. Insufficient or inappropriate producer goods lead to a barrier in people's pursuit of livelihoods which will impact negatively; therefore, access to appropriate infrastructure and producer goods enables poor people to achieve their livelihoods objectives (Chambers and Conway, 1992). For instance, without transport infrastructure, essential fertilisers cannot be distributed effectively; agricultural output will be low and makes it difficult and expensive to transport limited produce to the market (UK DFID, 1999:9).

2.5.3.4 Natural capital

Natural capital is the resource stock from which resources flow, and from which services (nutrient cycle, erosion protection) valuable for livelihoods are obtained (UK DFID, 1999). There are plenty of different natural resources constituting natural capital, from tangible public goods such as atmosphere and biodiversity, to divisible assets used directly for production (trees, land and water).

The output from these resources may be degraded or upgraded by human activity such as management. The land is an essential commodity that can sustain income growth and provide the essential potential of dragging the poorest out of poverty with provision of plentiful livelihoods (Jayne, 2001). It reflects the importance of natural capital as it provides for all life forms (human life), that is sustainable, as it ensures the catering of the present generation with the future generation in mind, regarding resource usage.

2.5.3.5 Economic or financial capital

Financial capital reflects the financial resources that people use to attain livelihood goals and it includes flow, as well as stocks, and can contribute to consumption as well as production (UK DFID, 1999). The two main sources of this capital are available stocks and regular flow of money (Kollmair and Gamper, 2002:6). Available stocks refer to cash, livestock, assets, bank deposits and not having debt, while regular flow of money relates to income benefits, insurance, state funding from other third parties.

2.5.4 Transforming structures and processes

Transforming structures and processes are the institutions, organisations, policies and legislation that shape the livelihoods (UK DFID, 1999). According to Kollmair and Gamper

(2002:7), transforming structures and processes is crucial to the SLF. They further believe that it provides feedback to the vulnerability context where policies influence trends such as environmental, economic and ecological through government and political structures (Kollmir and Gamper, 2002:7). Market structures are utilised to mitigate and lessen the effects of shocks (natural hazards) and the levels of seasons under normal conditions. This statement is backed by Adato and Meinzen-Dick (2002:9) who testified that these organisations and institutions shape the livelihoods of the households by influencing full access to various capital/assets, strategies and vulnerability.

According to the UK DFID (1999:19), structures are the hardware (the organisation – both private and public), that set and implement policies and legislations, delivery services, purchases, trade, and perform all manner of other functions that affect livelihoods. The processes are seen as the determining factors that assist structures and communities to realise sustainable livelihoods. Structures are significant in the sense that they make processes function; hence, without legislative bodies there is no legislation (UK DFID, 1999:19). The processes determine the path in which structures, that is individuals, operate and interact. For instance, processes are important to every aspect of livelihoods as they provide incentives, they grant or deny access to assets, they enable people to transform one type of asset into another and have strong influence on interpersonal relations or how different groups treat each other (UK DFID, 1999:20)

2.5.5 Livelihoods strategies

Livelihoods strategies are seen as the range and combination of activities and choices that individuals undertake in order to attain their livelihoods goals which include productive activities, investment strategies, reproductive choices (UK DFID, 1999:23). Chambers and Conway (1991:57), supports the statement, as they see the strategies as a means that seek to develop understanding of the various factors that influence people's choices of livelihoods strategies that strengthen the existing positive factors and mitigate negative influences.

Households can have more strategies as long as the aim is geared towards creating income, security, reproductive goals and its well-being (Adato and Meinzen-Dick, 2002:8). The pursuit of a broad variety of livelihoods strategies can have a positive effect on the household's financial stability and labour availability at various seasons in the year and even for poverty reduction strategies (Adato and Meinzen-Dick, 2002:8). This is a dynamic process where people combine different strategies to meet different needs at different times and strategies are transformed into livelihoods outcomes that are more proactive to the communities' needs (UK DFID, 1999:23).

2.5.6 Livelihoods outcomes

Chambers and Conway (1991:57) stated that livelihoods outcomes are the livelihoods strategies that provide communities with future visions packed with willpower and flexibility to acclimatise when faced with any challenge. Livelihoods outcomes may include increased income, food security and usage of sustainable natural resources, stable assets base, improved well-being and vulnerability reduction (Ashley and Carney, 1999). The livelihoods outcomes bring a strong objective to the study, as these suggest a feasible strategy to be implemented in the event of drought catastrophes.

2.6 Application of livelihoods approach

According to the UK DFID (1999:5), the success of livelihoods approach relies exclusively on its suitable applicability to the affected community situation; hence, it is crucial for every member of the community to be involved in the task. Six fundamental principles were suggested by Ashley and Carney (1999), which should be observed in order to bring success of the sustainable livelihoods approach, namely people-centred, holistic, dynamic, and building on strength, macro−micro links and sustainability. They are explained below:

2.6.1 People-centred

This approach tends to put the people at the centre. The objective is significant because it focuses on poverty eradication, economic reform or sustainable development (UK DFID, 1999:5). The approach means the following at practical level as stated by Ashley and Carney (1999:44):

- Starts with an analysis of people's livelihoods and the manner in which these have been changing over time.
- Fully involves people and their inputs and views.
- Focuses on the impact of different policy and institutional arrangements upon people/households and upon the dimensions of poverty they define (rather than on resources or output *per se*).
- Stresses the significance of influencing these policies and institutional arrangements so they promote the agenda of the poor.
- Works to support people to achieve their own livelihoods goals.

Sustainable poverty reduction will be realised only if external support – support from outside the household – is in collaboration with people in a way that is in harmony with their present livelihood strategies, social environment and ability to acclimatise (UK DFID, 1999). The political participation of the poor people themselves, works to support people to achieve their

own livelihood goals, though accountability should be maintained towards sustainability. The approach advocates that communities must be given free roles to provide solutions to challenges haunting them in all the stages of the project circle, respecting their viewpoints and empowering them through advocacy (UK DFID, 1999). The poor themselves must be the decisive actors in identifying and addressing livelihoods priorities.

2.6.2 Holistic

According to Ashley and Carney (1999:45), the sustainable livelihoods approach recognises that people do not live in isolated defined sectors as fishermen, farmers or isolated communities. Identification of livelihood-related constraints and opportunities is essential, regardless of the sector, level or area where they occur. The holistic approach attempts to identify the most persistent constraints faced by people, irrespective of where these occur (which sector, geographical space or level, from local to international) (George, 1997). It is seen as multiple, because it assists in highlighting not only that different people adopt various livelihood strategies and pursue different livelihoods objectives, but the same people concurrently undertake a variety of different activities and seek to achieve an array of different goals (UK DFID, 1999:5).

The SLF helps to organise the different factors which constrain or provide opportunities and how these opportunities are related to each other. It is not intended to act as a precise model of the manner the world is, nor does it mean to advocate that participants themselves necessarily adopt a systematic approach to problem-solving (UK DFID, 1999:5). The approach calls for the cross-pollination of ideas or skills of participants and communities so as to realise multiple livelihoods outcomes. The approach reflects understanding of how shaping of people's livelihoods and different influencing factors can be adjusted in order to produce plenty of beneficial livelihoods outcomes (Ashley and Carney, 1999).

2.6.3 Dynamic

Just as people's livelihoods and the institutions that shape them are highly dynamic, so is the approach (UK DFID, 1999:6). It tries to comprehend and learn from change so as to support positive patterns of change and assist in mitigating the negative patterns. The external support needs to recognise the dynamic nature of livelihood strategies, respond flexibly to changes in the people's situations, and develop long-term commitments (Ashley and Carney, 1999). It calls for recurring investigation and an effort to unearth the nature of a complex, two-way cause and effects relationships as well as chains of events (George, 1997). This advocates the flexibility to change in people's situations and is a significant strategy with regard to poverty reduction.

2.6.4 Building on strength

The significance of this approach is that it begins with an analysis of strength rather than needs as per its principle (George, 1999). It implies recognition of everyone's intrinsic potential, whether this derives from their strong social networks, their access to physical resources and infrastructure, their ability to influence core institutions or any other factor that has poverty-reducing potential (UK DFID, 1999:6). This deduces that identifying community strength rather than the needs, helps build their self-confidence that forms a significant component for the achievement of own objectives.

2.6.5 Macro−micro links

This development activity reflects on either the macro or the micro level (UK DFID, 1999:6). Nonetheless, the livelihoods approach tries to bridge the gap between the macro and micro level, emphasising the significance of macro level policy and institutions to the livelihoods options of communities and individuals (George, 1997). Ashley and Carney (1999) stated that poverty elimination is a massive challenge that will only be overcome by working at multiple levels, ensuring that micro level activity informs the development of policy and an effective enabling environment. These macro level structures and processes support people to build upon their own strength. The isolation of rural areas has repeatedly led to an underestimation of the impact upon rural people of policies and events stemming from the urban or further afield at international level (UK DFID, 1999:6). The focus of rural development has a tendency to remain quite micro and local. It, therefore, requires that the poverty elimination programmes be addressed at multiple level structures and the processes should increase community resilience (Ashley and Carney, 1999).

2.6.6 Sustainability

Sustainability is a significant qualifier to the DFID view of livelihoods as it relates that progress in poverty reduction is lasting rather than brief (UK DFID, 1999:7). It does not mean that any given resource or institution must survive in exactly the same way, but it implies accumulation in the broad capital base that provides the basis for improved livelihoods, especially the poorest community. George (1997) suggested four key dimensions to sustainability, namely environmental, economic, social and institutional in nature. It shows that sustainability in a community can only be measured by the community's resilience in the face of external shocks and stresses, its ability to stand on its own without external support, ability to maintain long-term productivity of natural resources and not compromising livelihoods of the coming generation. The successful implementation of the sustainable approach relies on the promotion of stakeholder's participation, and development programmes that are worth

implementing are those that are people-centred, ensuring that there is community resilience and participation at all stages of the project (George, 1997)

2.7 Drought management and mitigation options

2.7.1 Drought plan

The National Drought Mitigation Plan in the United States has piloted various workshops on drought planning in South Africa and Brazil where emphasis was based on a 10-step process (Table 2.4) (Wilhite, 1991). The emphasis was to plan for mitigation and preparedness for areas that were faced with drought event around the world.

TABLE 2.4: THE TEN STEPS PLANNING PROCESS

Step 1	Appoint a drought task force.
Step 2	State the purpose and objectives of the drought plan.
Step 3	Seek stakeholder participation and resolve conflict.
Step 4	Inventory resource and identify groups at risk.
Step 5	Develop organizational structure and prepare drought plan.
Step 6	Identify research needs and fill institutional gaps.
Step 7	Integrate science and policy.
Step 8	Publicise the drought plan and build public awareness.
Step 9	Develop education programs.
Step 10	Evaluation and revise drought plan.

Source: National Drought Mitigation Centre (2007)

These steps are explained below.

Step 1: Appoint a drought task force

For the plan to be successful, it relies on political drive within the country where the president appoints a multidisciplinary drought task force to coordinate and administer the plan. The task force has two important functions to perform, according to the NDMC (2010) and Wilhite et al. (2000:2). The first performance is done when the task force supervises and coordinates the development of the plan. The second performance unfolds where after the plan is developed during the drought, the task force synchronises actions, applies mitigations and response programmes and makes recommendations. It is required of the task force to incorporate relevant stakeholders who are knowledgeable about effective communication with the community.

Step 2: State the purpose and objectives of the drought plan

The task force should be guided by the terms of reference as they state the purpose and specific objectives for the drought plan. The objective should show the specific characteristics of the region that is discussed.

The government authority should have the following questions on the plan as stated by Wilhite et al. (2000:2):

- Scope of plan.
- Most drought prone areas of country.
- Historical impacts of drought.
- Historical response to drought.
- Most venerable economic and social sectors.
- Role of plan in resolving conflicts among water users.
- Current trends such as land, water use, or population increase that may increase or decrease vulnerability and conflicts in future.
- Resources – human and economic – that the government is prepared to utilise in the planning process.
- Concern on environment quality.
- Legislations and social implications of the plan.

The task force will differ according to the uniqueness on physical, environmental and socio-economic status of affected areas and the task force should identify the specific objectives for the support (Wilhite et al., 2000:2).

Step 3: Seek stakeholder's participation and resolve conflict

The task force needs to find all groups that have a part in drought planning and should consult and understand their concern or interest.

It is the responsibility of the task force to protect the interest of stakeholders who may not be financially stable to serve as their own supporters. The task force should unite the neighbours to discuss issues of water usage and problems to come up with relevant solutions (Wilhite et al., 2000:2). The government should ensure that each district has a representative in the advisory council so as to bring the interests and values of their constituencies.

Step 4: Inventory resources and identify groups at risk.

A list of biological, natural and human resources together with their vulnerability to drought should be carried out, and the limitations to the planning process must be identified. The task

force should attend to the list and address these issues earlier so as to provide direction to the working committee.

Step 5: Prepare/write the drought plan

The contents of the drought plan should have three primary components: (1) monitoring, early warning and prediction; (2) risk and impact assessment; (3) mitigation and response.

The drought plan should have monitoring, risk assessment, and mitigation and response as the crucial components (NDMC, 2005). The task force (mitigation and drought response), should be able to recommend and implement mitigation measures, ask help from the government in various programmes or make policy recommendations to the legislature (NDMC, 2005). The process will provide appropriate direction to identification of effective drought risk reduction measures that will mitigate the long-term drought impacts instead of bringing untested mitigation actions.

Step 6: Identify research needs and fill institutional gaps

The task force should identify and consolidate an inventory of research needs and gaps in institutional accountability and make recommendations on how to work around them.

Step 7: Integrate science and policy

There is need to have two-way communication between science and policy makers. Policy makers may not be conversant with scientific technical aspects of the drought, while science on the other hand, might be familiar with policy constraints. The mutual working together will bear appropriate results. The planning process will be significant in setting research priorities and synthesising the drought situation in the current time where climate and water supply indexes are crucial (NDMC, 2005).

Step 8: Publicise the drought plan and build public awareness

During the drought event, the task force should keep the public abreast of the status of water supplies, the situations that lead to request for water usage restrictions and measures that are appropriate to access drought assistance. Significant information should be placed on a website to the community to access it directly without relying solely on the mass media.

Step 9: Develop education programmes

Education programmes should be designed to bring awareness of short- and long-term water supply issues. The drought task force should develop educational materials that will assist such as in a Water Awareness Week, community observations of Earth Day, Arbour Day and specialised workshops, and the workshops on natural resource conservations (NDMC, 2005).

Step 10: Evaluate and revise drought plan

For the plan to be appropriate it requires a vigorous monitoring and evaluation component characterised by sporadic testing, evaluation and updating of the drought plan that will keep the plan active to local, provincial or national needs (NDMC, 2011; Wilhite, 1991, Wilhite, 2002, Wilhite et al., 2000, Wilhite et al., 2005).

The ten steps which are discussed above form a basis for prominent drought mitigation. In Australia, which falls in almost the same latitude line as South Africa on the globe, has a similar continental aridity to South Africa. Australia has developed a drought management strategy which can be applicable in the South African context (Heathcote, 2000). The decisions made on drought mitigation measures are based on climate analysis, assessment and forecasts, as well application of simulation models for agricultural commodities and markets are promoted (Heathcote, 2000).

A large proportion on economic welfare as accounted by agriculture and drought impacts may be minimised by frequent reduction of the Gross Domestic Product (GDP) share from agriculture, by soil conservation means and removal of old-fashioned drought relief policies (Heathcote, 2000).

Lastly, enhanced decision-making is essential for drought disaster mitigation. South Africa has an improved forecasting reliability as from the year 1990 (Williams, 2000). Proper weather forecasts will alleviate or obviate farmers' fears, reduce vulnerability to drought through preparedness and appropriate policies (Blench, 2003). Various methods for reducing drought impacts can be applied, such as improved drought mitigation, improving food security and reducing poverty (Vogel et al., 2000). South Africa and Australia can collaborate in an effort of sharing ideas for dealing with drought.

2.7.2 Drought mitigation options

2.7.2.1 A case study from rain-fed rice farming in Asia

Drought is found to be a recurrent event and a significant constraint on yield in humid and sub-humid rice-growing areas of Asia (Pandey and Bhandari, 2009:7). Around 23 million hectares of land are drought prone, representing a fifth of the total rice production of the region. There are prominent changes highlighting the increasing frequency and intensity of droughts in many parts of Asia (Pandey and Bhandari, 2009:7). These increases are attributed mainly by escalation in temperature during summer, normally drier months and during ENSO events.

Drought mitigation measures are established as effective recurring means to cope with drought as well as addressing the drought risk. These measures are categorised as collection of measures applied for households in drought prone areas (Hazelton et al., 1994:32). According to Pandey and Bhandari (2009:36), the following are the significant measures applied in Asia to mitigate the situation: agricultural research, technology design considerations, water resource development, drought characterisation and mapping, drought relief and long-term drought mitigation, drought forecasting and preparedness, policies for promoting income diversification, and lastly, crop insurance. Below is a summary of these mitigation measures as established by Pandey and Bhandari (2009:36-40):

Agricultural research

Improved rice technologies that help reduce losses from drought can play a major role in long-term drought mitigation. Progress has been made to developing drought-tolerant rice germplasm through convectional breeding and use of molecular tools (Atlin et al., 2006). The probability of success in developing such germplasm is such as to be substantially higher than a decade ago. Complementary, the research on crop management through manipulation of crop establishment, fertilisation and care to avoid drought stress, better way of soil moisture usage, enhancement on the plant's ability to recover rapidly from drought, can similarly assist in reduction of losses.

The level of agricultural research in developing countries is found to be generally low, while in developed countries it is high, namely in developing countries agricultural GDP in research expenditure is estimated at 0.62%, while in developed countries agricultural GDP expenditure is at 2.6% (Pal and Byerlee, 2003). Agricultural research in developing countries of Asia remains underinvested; therefore, in order to achieve an important impact, an institutional setup is needed that will promote multidisciplinary research and brings in other stakeholders such as resource managers and representatives from NGOs and farmer associations in order to undertake a problem-solving research (Pal and Byerlee, 2003).

Technology design consideration

Technology should improve flexibility in decision-making regarding crop choices, timing and method of crop establishment and the timing quantity of various inputs (Pandey and Bhandari, 2003). Flexibility in agricultural technologies allows farmers to adaptively capture income-increasing breaks when these arise. Those technologies lock farmers into a fixed set of practices and timetable that do not permit effective management of agricultural risk.

Poverty is increased by loss in agricultural production due to drought in years; hence, technologies reduce production loss which can mitigate such adverse impact on poverty even

if there may be trade-offs in yield during favourable years. In rain-fed areas, the land endowments of farmers normally consist of fields across the top sequence having various hydrological conditions. The upper part of the top sequence is found to be more drought prone than those in the lower part. Farmers exploit such hydrologically diversified assortment of land by planting a variety of rice that matches ground hydrological structures.

Breeding programmes can produce a wider range of choices of plant materials that link to field hydrological features and they can produce various characteristics, different responses to drought and can play an essential role in effective protection. Therefore, rice technologies that promote diversification are needed, also in rain-fed areas; shorter duration rice varieties can facilitate planting of a second crop using residual moisture (Pandey and Bhandari, 2007). Likewise, rice technologies that increase labour productivity and rice production will facilitate crop and income diversification. Crop diversification is an important drought-coping mechanism of farmers.

Water resource development

There are considerable opportunities to provide some protection from drought through small and minor irrigation schemes and through land-use approaches that generally augment soil moisture and water retention (Shah, 2001). Equally, a watershed-based approach implemented in drought prone areas of India is providing opportunity to achieve long-term drought-proofing by improving overall moisture retention within the watershed area (Hanumantha Rao, 2000).

The support from the public sector for extensive rehabilitation, development and maintenance of minor irrigation schemes could make a vital exercise in mitigating drought (Hanumantha Rao, 2000). The involvement of the public sector should be narrowed to the provision of technical assistance where the actual management of these small-scale schemes is left to local communities. The farmers who managed irrigation systems using traditional institutions were found to be efficient, effective and sustainable in managing irrigation in several Asian countries, even in India (Hanumantha Rao, 2000).

Drought characterisation, analysis and mapping

While drought occurs frequently and government counters by allocating relief and other forms of help to affected communities; a detailed scientific characterisation of drought, analysis of its impact and mapping are needed at local, provincial, district or national level (Pandey and Bhandari, 2007). Actions such as analysis and mapping are critically significant in developing and implementing suitable short- and long-term strategies for drought mitigation. Research in India is advanced as it established such interventions in drought management at various levels

to improve mitigations, though its focus is only on arid and semi-arid zones. There is need to expand its focus on other zones, so as to implement long-term drought mitigation measures.

Drought relief and long-term drought mitigation

India has a more elaborate institutional setup for drought relief that focuses on employment generation through public works. Hunger and starvation are major challenges, and the relief measures are geared towards improvement on those incidences. Sometimes the challenges with relief programmes are slow response, poor targeting of beneficiaries and limited allocation due to budget constraints. According to Hanumantha Rao (2000), there is progress made in watershed development programmes in diverse areas of India, but the programmes are not sufficiently integrated into overall agricultural development activities. Therefore, a decentralised institutional system is a necessity that will promote a bigger involvement and decision-making by local-level interventions as a way to bring bottom-up effective relief programmes.

Drought forecasting and preparedness

Rice farmers in Asia do not receive much advance warnings of imminent droughts. The knowledge of the drought forecasting system, the provision of advice to farmers, identification of effective agricultural management practices to minimise drought are means to reduce overall economic cost of drought and improve preparedness. Drought forecasting have scientific advances in meteorology to provide a reasonable degree of accuracy and reliability as different indicators such as the Oscillation Index are used in this regard (Wilhite, 2000).

Policies for promoting income diversification

The policy intervention is an essential activity for improving drought management. Policies that promote rural income diversification are crucial for both general income growth and efficient risk management. The rural infrastructure, as well as the marketing activity, including promotion of rural and agro-processing industries that allows farmers to diversify their income source, is significant to reduce income risk. The widening and deepening of rural financial markets will also be an important activity to reduce variations in consumption and income (Barret, 2005).

Crop insurance

The insurance on crops is a potential market basis tool to safeguard farmers from weather-related risks such as drought. There is a need to develop and test the current types of insurance products and schemes that are suited to the millions of small farmers of Asia who produce rise for subsistence.

In conclusion, it is clear that there are many challenges that the community of are Asia faced with regard to drought on their source of livelihood (rice). The technological intervention and improvement in rural structure can serve as potential measures applied to mitigate the drought situation in Asia.

2.7.2.2 A case study in Kenya

The Moyale district in Northern Kenya is found to have 70% of households who were dependent on livestock for income, where 67% of the population live below the poverty line (Erasmus et al., 2012). Drought has depleted household assets and the community's coping mechanisms. The community of the Kitui district in eastern Kenya have no alternative but to survive in their drought prone area where they are burdened by chronic malnutrition and lack of food resources (UNISDR, 2008).

The following measures were applied by the Moyale district to mitigate their situation: community managed disaster risk reduction, strengthening government capacity to respond, and early scaling up of food, nutrition and livelihood intervention, and? coordination (Erasmus et al., 2012). These mitigations are summarised below.

Community managed disaster risk reduction

The set of initiatives has been created to bring resilience among pastoral communities where the core component was on community dialogues using a community conversation approach. Communities are engaged in interrelated development activities that has flexible time frames and scope which can be adapted as the crisis emanates.

Promoting diversified livelihoods

Moyale town, in particular, as relying on one livelihood strategy is risky, benefit from a thriving petty trade market with a strong cross-border element and active international and regional livestock market. The livestock market infrastructure made it possible for fewer pastorals to be completely dependent on livestock and livestock products only. There is introduction of retail businesses, hide and skins trade, veterinary pharmacies and dryland farming which enabled the production of kale, onions, tomatoes and fruits which are marketable and bring dietary diversity (Erasmus et al., 2012).

Switching to drought-resistant livestock

The community members had to diversify their livestock by including camels. The camels are more drought resistant and their milk is more nutrient-rich than that of cows for children under five years of age. The pastorals resorted in requiring camels for marriage gifts and technical

advices were provided for livestock workers on how to care and manage herds of camels (Erasmus et al., 2012).

Conflict mitigation

Conflicts in Moyale are always aroused by contest over scarce resources. The solution to this could be on organising and enforcing grazing patterns and bringing together groups to discuss the challenges and solutions (Erasmus et al., 2012). Community members agreed on allowing animals to overlap their territory by moving freely between water and pasture. Lastly, community members developed a peace committee (district security team) for intervention purposes in case conflicts arise.

Increasing water availability

Water points in Northern Kenya are managed by water user associations. Water catchment dams and underground tanks to harvest rainwater were constructed. The dams minimised the distance that pastorals have to travel in search of water and the project increased water availability for the community (Erasmus et al., 2012).

Strengthening government capacity

A nutritional project was implemented in collaboration with the District Health Management Team. The aim was to reduce health and nutrition-related morbidity and mortality, while at the same time preventing and treating the acute malnutrition. They included technical training to the District Health Management Team staff and community health workers and adopted serious interventions on mortality (Erasmus et al., 2012).

Scaling up food, nutrition and livelihoods interventions

By 2010 it was reflected by the Famine Early Warning System Network that Moyale district was faced with the risk of becoming highly food insecure. The cautioning led to teamwork of the Kenyan government and local partners, on scaling up high impact nutritional interventions across the district. A total of 123 community health workers were recruited, six new health facilities were opened and formal and on-the-job training was provided for health workers (Erasmus et al., 2012).

The World Vision Project for Emergency Assistance in Kenya programme was linked with vulnerable households within Moyale. Additional programmes were established to provide education and agriculture. A food voucher scheme of about 3 000 poor households was implemented and interventions reached 33 935 direct beneficiaries, 7 000 children under five and 1 500 pregnant women (Erasmus et al., 2012).

Coordination

A coordinated effort was made among the community, World Vision, World Food Programme, and District Health Management Team in order to rationalise supply pipelines of food and nutrition treatment commodities. The families of those children and women admitted to nutrition treatment programmes were targeted for food aid.

The disaster risk reduction management intervened by reinforcing the resilience on families whose children suffered from malnutrition. The coordination inputs made noticeable impacts with regard to lowering malnutrition in Moyale (Erasmus et al., 2012).

2.8 Conclusion

The literature review has indicated the disastrous effects of droughts leading to shortage of water as resource leading to vegetation, livestock, communities, economy and environment suffering. Different characteristics of drought were discussed, with the emphasis on meteorological, agricultural, hydrological and socio-economic types and how they differ in terms of occurrence. Meteorological drought is seen as dryness in relation to average duration of dry periods, while agricultural drought happens when there is a shortage of moisture content on topsoil. Hydrological drought results from persistent low water volume in streams, and socio-economic drought is seen when there is existence of supply and demand, prices of food rising and economy of country declining.

Vulnerability to drought demonstrates how communities can be susceptible to drought. You have not discussed this. Components included root causes, dynamic pressure and unsafe conditions that could lead to disaster event. The more vulnerable the community is to drought, the higher the chances of that community to experience the drought impact.

The SLF disclosed how the instrument can develop understanding on livelihoods on the disadvantaged poor. It places the communities' needs before everything regarding livelihoods. The ten steps for drought planning were discussed which demonstrates the significance of the task force in ensuring the planning and mitigation of drought.

The discussion to follow in the next chapter will look on the legislation framework on drought events.

Chapter 3
Legislative Framework

3.1 Introduction

Different countries of the world approved the significance of drought risk reduction by introducing legislations and policies to deal with drought related issues (Vogel, 1998). Vogel (1998) further postulated that the extent to which a country copes with drought risk is determined by the policy makers in government when decisions regarding legislations and policies are made.

The people and institutions are aware of destitutions and dangers that drought poses to communities whose livelihoods are vulnerable to drought (UNISDR, 2007:13). Institutions need to be devoted to disseminating information and implementation of relevant policies in their endeavours of reducing human suffering and environmental damage due to drought. Constructing drought resilience requires long-term attentions and should be a fundamental part of policies related to water, food security, agriculture and hazard planning as perceived by the UNISDR (2007:13). The significance of policy establishment is emphasised by the Australian government as they moved away from a crisis management approach for drought to an increased emphasis on climate risk management (Australian Bureau of Agricultural and Resource Economics and Sciences [ABARES], 2012:7).

Prior to the 1990s, there had been little measures to prevent the impact of drought from causing serious damage. Agriculture suffered a great deal during past drought events (Vogel et al., 2000). However, during the early 1990s, there was a slight shift in policy from a more reactive to a proactive approach to drought management (Bruwer, 1989; Vogel et al., 2000). The Disaster Management Act of 2002, as a revised policy, was one of the serious policy interventions by the South African government for various sectors, yet there were still some insufficiencies (Chabane, 2004). According to Chabane (2004), the commercial farmers were the only ones who benefited from the introduced policy, while the predicament on small-scale farmers did not improve during the drought. The National Disaster Risk Management Framework of 2005 ultimately saw a positive movement towards effective drought management and mitigation (Van Zyl, 2006). Thus, drought occasions have resulted in many policy reforms, as agriculture and vulnerable societies have been affected in various ways stimulating government to re-evaluate their drought policies (Van Zyl, 2006).

This chapter will provide a discussion on South African disaster management legislation, the evolution of drought policies in South Africa, the policies as well as structures and programmes applied to mitigate and reduce drought in the country.

3.2 Disaster management policy in South Africa

South Africa has a strong set of disaster management policies and legislation which includes other relevant laws that are aiming at disaster risk reduction. The instruments have been developed from 1994 after South Africa was declared a constitutional democratic country. The Constitution of the Republic of South Africa (1996) did not only articulate various numbers of rights which bind the legislature, the executive, the judiciary and all organs of state, but established a blueprint for the structure of governance

The Constitution of South Africa (1996), section 41(1) (b), obliges the various spheres of government to “secure the well-being of the Republic”. Chapter 2 of the constitution (Bill of Rights) stipulates that every citizen in the country has the right to “life, equality, human dignity, environment, property, health care, food, water and social security”. The rights stated above are coexisting with the main objectives of disaster management as South African government’s obligation.

It was after the June 1994 floods in the Cape Flats in South Africa that the cabinet committed to assess South Africa’s ability to handle risk reduction and disaster management. The disaster management structures and approaches were revisited, where in 1995 the cabinet endorsed that the formal structures for disaster management be recognised. The cabinet strengthened the government’s commitment to disaster management to develop a national policy and strategy by formulating an inter-ministerial committee for disaster management during 1997 (Green Paper on Disaster Management, 1997:11). The inter-ministerial committee had an interim disaster management centre that included 10 national government departments. They met on a regular basis for coordination, dissemination of information and design of strategies to handle disaster-related matters.

The following section discusses the evolution of drought policies in South Africa to reflect on where the country originates with drought and how it was dealt with during the past decades.

3.3 Evolution of drought policies in South Africa

The overwhelming effects of drought in South Africa led to endeavours by the government to deal with hazards as from the twentieth century (Dobson, 2004; Vogel, 1994c). The government has been trying to work with drought since 1914, where soil erosion was the most worrying factor (Dodson, 2004). The government has been conducting several drought

commissions leading up to 1991/92 in South Africa. Van Zyl and Vogel (2009) acknowledged the years 1960/70, 1967/68, 1968/69, 1981/82 and 1982/83 as years of consecutive drought spells in South Africa. South Africa experiences a mild and temperate climate and there is a great precipitation variance spatially around the country with high seasonal inconsistency (Van Zyl et al., 2009).

During the 1960s, the South African government had suggested the development of new drought relief and management structures in order to relieve drought in various provinces (Vogel, 1994a/b). The new drought committee was established and proposed a bureau to be put in place. The bureau was made up of a minimum number of staff that was only increased during emergency conditions (Vogel, 1994a/b). Around the 1960s and 1980s, the drought committee focussed largely on livestock maintenance and sustainability, instead of supporting poor communities in rural villages (RSA, NDA, 2005a).

The Drought Investigation Commission of 1914 identified soil erosion as the main factor worsening the impact of droughts that distressed farmers (Dodson, 2004). The recommendation of the report in 1923 requested conservation on soil, better veld, stock and water management to reduce soil erosion (Dodson, 2004; Vogel, 1994a). Table 3.1 gives a summary of the report.

Various responses to drought emanated as a result of the need to bring relief to farmers in order to ease the loss from impacts of drought (Vogel, 1998). Drought usually fell under the domain of DAFF, where farmers receive relief and support from DAFF. As part of a phased relief after 1980, the government supplied transport allowances, loans and subsidies (Bruwer, 1989; Vogel, 1994c). Farmers were engaged in the conservation philosophy where drought aid was reserved for farmers that applied a conservation approach (Austin, 2008:57). The declaration of drought in the 1980s was on the basis of measures such as rainfall over three seasons, availability of water for livestock, veld conditions, stock conditions/deaths and accessibility of fodder to be bought (Bruwer, 1990). The declaration of a drought disaster would be done if rainfall over two successive seasons was 70% or less of the average main precipitation of the area concerned (Van Zyl and Vogel, 2009). It was expected that half of the population of the areas that experienced drought were at risk of malnutrition and other health complications (Monnik, 2000).

TABLE 3.1: DROUGHT RESEARCH COMMISSION AND INVESTIGATION IN SOUTH AFRICA FROM 1914 to 1990

Year	Commission/Report	Key Issues
1914	Commission of drought	Assessment of drought periods and drought enhanced erosion
1923	Report on drought examination and commission	Assessment on poor farm management and practices Recommendations suggested
1941	Provision against drought nationally	Study on extent of drought and relief measures
1946	Phase drought relief scheme	Development of drought assistance schemes
1949	Report of fodder bank committee on drought	Drought insurance scheme suggested for those areas; emerging farmers and fodder storage for provision during emergency
1965	Report on drought feeding	Development of drought relief plan and central drought committee
1968	Drought planning and assistance	Improved skills and natural resource management system (soil and production)
1970 1972	Commission of enquiry into agriculture Final report of commission of enquiry into agriculture	Farming system to be aligned to changing climatic conditions Financial assistance should be made in line with those farmers who show cautious farm management and applying farming systems that are suited to natural conditions
1980	Investigation of veld degradation and increased dryness of the Karoo	No indication of drastic climatic change that could have altered plant vegetation growth Major drought impacts experienced by cattle farmers and attention should be given to support them
1980	Drought scheme proposed	Scheme aimed at protecting natural resources and provided assistance to farmers to cope with drought as well as encouraging them to be self-sufficient

Source: Vogel (1994c)

Drought in the late 1980s and early 1990s forced government to bail out farmers with money through the Department of Agriculture (Van Zyl and Vogel, 2009). Much of the support was implemented in the form of debt relief that favoured white commercial farmers as it was perceived in the past (Smith, 1993; Vogel, 1994c). According to Vogel et al. (2000), little relief was, nevertheless, given to black farmers and the rural poor. According to Austin (2008:57), there was a minimal determination to get farmers to be more autonomous, proactive and to have a vision for themselves to deal with drought eventualities. The basic planning and implementation of strategies to alleviate drought included contingency plans and changes in accordance to water supply/demand to reduce the impact of drought (Yevjevich et al., 1978). Vogel et al. (2000) stated those marginal farmers and those who did not add value to the GDP, were not aided by policies as policies focused more on inefficiency and low profitability than issues related to food insecurity and rainfall.

Many felt that there was a need for a more proactive drought management approach that would look at risk management rather than crisis management (Bruwer, 1989). The 1991/1992 drought steered drastic changes with regard to drought and a national drought forum was

established to provide for emergency response during drought (Bruwer, 1989). The National Consultative Drought Forum helped drought relief and provided information on the progress of the drought and drought intervention (Vogel et al., 2000). The impacts of drought were categorised by health, water supply, and agricultural relief demands and exceptional devotion was put on the supply system, communication system and maintenance of essential infrastructure (RSA, NDA, 1993).

Post-1994 democracy in South Africa, there was a need for a proactive disaster approach to assist commercial and subsistence farmers (RSA, NDA, 1993). Subsequent legislative tools were introduced post-1994 to ensure that the government and communities collaborate during drought episodes, namely: Disaster Management Act, Act 57 of 2002; National Disaster Risk Management Framework of South Africa (, RSA DAFF, 2005); Drought Management in South Africa and the Agricultural Drought Management Plan (ADMP). The National Disaster Management Committee was established at national level and it focused on pre-disaster risk reduction and an integrated disaster information system at local and provincial levels.

. These legislative tools are discussed in the following sections.

3.3.1 Disaster Management Act, Act 57 of 2002

Act 57 requires that all stakeholders must take part in risk reduction programmes as suggested in the White Paper on Disaster Management (1999). The policy is a unified act that pays attention on preventing, mitigating and reducing the brutality of disasters. The same sentiment was echoed by Van Zyl (2006:49) who saw the Act as:

> *an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery. Also, the establishment of national, provincial and municipal disaster management centres, including the allocation of disaster management volunteers in different local and district municipalities.*

The incorporation of prevention and mitigation strategies with development plans, programmes and initiatives sought to assist government and society in working in collaboration towards realising sustainable development and risk reduction (Vogel, 1998). The Act identifies that the policies are not operational in the absence of governmental spheres, NGOs, communities and insurance bodies. According to Van Zyl (2006:81), disaster risk reduction strategies are there to reduce the level of vulnerability to poor societies and ought to support the societies to be resilient in the future.

As stated by Backenberg and Viljoen (2003:8), the Act has a command to protect society and environment, therefore the obligation is to shift from the dogma that disasters are shocks and should be managed by emergency response services and rescue teams for response instead of disaster reduction. The Act proposes a shared vision and responsibility that involves institutional emergency and response capacity (information, monitoring and evaluation) that should reduce risk in households, society and community in general.

The Act brought numerous responsibilities of the National Disaster Management Centre (NDMC), namely:

- To ensure that an effective disaster management strategy is fully developed and implemented within all the spheres of South African government and other stakeholders (other departments, NGOs and private organisations).
- To guide the development of a comprehensive information management and communication system.
- To coordinate disaster risk management at all levels of government.
- To make recommendations on the funding of disaster risk management and initiate and facilitate efforts to make such funding available.
- To promote and assist the implementation of disaster management measures in all sectors of society.
- To establish relationship and communication links with other countries to enable them to share their different experiences regarding disasters.
- To assist with the establishment of a mechanism for creating public awareness to inculcate a culture of risk avoidance.

The application of the above measures would ensure risk reduction in the societies, communities and households.

3.3.2 National Disaster Management Framework of 2005

The Disaster Management Act, 2002 (Act No. 57 of 2002) identifies various opportunities in South Africa to evade and mitigate the disaster losses through means by spheres of government, civil society and the private sector. (SA NDMF, 2005). The NDMF is the legal instrument specified by the Act to address such needs through provision of comprehensive policy on disaster management relevant for the entire South Africa.

The NDMF of South Africa drafted the steps that applied to the scope and development of disaster risk reduction plans, projects and programmes to guide national, provincial and municipal spheres of government (SA NDMF, 2005) Create clear goals and targets for disaster risk reduction initiatives, link monitoring and evaluation criteria to community-based disaster risk assessment findings. These should to be connected to initial assessment findings to show the efficiency of the specific initiative in reducing the vulnerability of communities.

- Create informed multidisciplinary teams with the capacity to address the disaster risk and identify a primary entity to facilitate the initiative. This implies that disaster risk management needs both the technical expertise in a hazard process, as well as an understanding of the complex social and economic conditions that drive risk in vulnerable communities.
- Vigorously involve the group or community at risk. Disaster risk reduction planning needs to regularly consult the group and community at risk as it becomes effective when those affected are included in the planning process. Local knowledge (indigenous) and expertise are essential during risk reduction.
- Address multiple vulnerabilities wherever possible, Programmes and disaster risk reduction should add value to other development initiatives. In this context, various vulnerabilities can be addressed through the following outputs:
    - Improving socio-economic conditions and building community cohesion.
    - Ensuring the continuity of protective environmental services.
    - Increasing resilience and/or continuity of public services and infrastructure to better respond to external shocks.
- Plan for changing risk conditions and uncertainty with inclusion of the effects of weather.
- Apply precautionary principles to avoid inadvertently increasing disaster risks. This is centred on the fact that the probability of accidental negative results is reduced if disaster risk assessment actively informs the planning process. A proficient multidisciplinary team can be established where mechanisms for transparent community consultation is put in place.

The NDMF was designed into four Key Performance Areas (KPAs) and three Enablers as stated by Van Zyl (2006:52). The focus was on establishing significant institutional arrangements for implementing disaster risk management to reduce the likelihood and severity of disasters. The following is a list of the four KPAs and three Enablers, followed by their brief summary:

- **Key Performance Areas**

    1. The integrated institutional capacity for disaster risk management.
    2. Requirement for disaster risk assessment.
    3. Planning and implementation to reduce disaster risk.
    4. Disaster response, recovery and rehabilitation

- **Enablers**

    A. Establishment of information management and communication.
    B. Priorities in education, training, public awareness and research.
    C. Funding mechanisms for disaster risk management.

Key Performance Areas

1. THE INTEGRATED INSTITUTIONAL CAPACITY FOR DISASTER RISK MANAGEMENT

The Disaster Management Act (RSA, 2002) requires the formation of a National Disaster Management Centre (NDMC) which needed to be answerable to promotion of an integrated and coordinated national disaster risk management policy for KPA 1. Van Zyl (2006:51) saw the Intergovernmental Committee on Disaster Management as the first structure for disaster risk management. He believed that these structures were made up of department and cabinet members that were involved in the national legislature. The NDMC and the Disaster Management Advisory Forum consisting of national, provincial and municipality members, were established in this category to work in consultation. The Disaster Management Advisory Forum was responsible for coordinating joint consultation for different role players and to promote and integrate their various activities regarding disaster risk management.

2. REQUIREMENT FOR DISASTER RISK ASSESSMENT

KPA 2 looked at forming and organising disaster risk assessments within the country. The objective was to form an approach of assessing and monitoring disaster risk which would inform the disaster risk management structures of various department levels in government (Van Zyl, 2006:52).

In his study on the disaster risk management plan for the South African agricultural sector, Van Zyl (2006:57) required that the following disaster risk assessment be undertaken:

- Anticipation and plan for known hazards or disasters to prevent losses and limit endangering impacts.
- Ensure that development initiatives maximise their vulnerability reduction outcomes.

The overall process for assessing disaster risk involved the following stages as suggested by the study on the disaster risk management plan for the South African agricultural sector (Van Zyl, 2006:58):

Stage 1: Identification of the specific disaster risks

- Identify and describe the hazard with respect to its frequency, magnitude and speed of onset, affected area and duration.
- Estimate the likely losses from the action of the hazard on those that are vulnerable, to evaluate likely consequences or impacts.
- Identify relevant capacities, methods and resources already available to manage the risk. Assess the efficiency of these, as well as gaps, inconsistencies and ineffectiveness in government departments and other relevant agencies.

Stage 2: Analyse the disaster risks

Estimate the level of risk associated with a particular threat or hazard to determine whether the resulting risk is a priority or not.

Stage 3: Evaluate the disaster risks

It involves the further prioritisation of disaster risks when there are numerous threats or hazards to assess.

Stage 4: Monitor disaster risk reduction initiatives and update and disseminate disaster risk assessment information

In this stage, there was ongoing monitoring to measure the effectiveness of disaster risk reduction initiatives, identifying changing patterns and new developments in risk profiles, and update and distribute information for the purpose of disaster risk management planning.

3. PLANNING AND IMPLEMENTATION TO REDUCE DISASTER RISK

The plan had to specify clear institutional arrangements for coordinating and aligning the plan with other governmental initiatives and plans of institutional role players (Van Zyl, 2006:59). Planning also needed to indicate evidence of informed disaster risk assessment and continuous disaster risk monitoring capabilities that include relevant developmental measures to reduce the vulnerability of disaster prone areas, communities and households. Van Zyl (2006:58) believed that the objective of KPA 3 was that the role players in disaster risk management should work towards developing disaster risk programmes and systems that were in line with the approved frameworks. He further proposed that the NDMC should ensure

that all stakeholders and different levels of government should produce their own disaster risk management plans and frameworks.

Not all communities, households and areas face the same disaster risks, according to Van Zyl (2006:62). In dealing with disaster risk management planning, the priority should be on communities, households and areas that are exposed to natural or other threats and have minimum capacity to resist and recuperate from the subsequent impacts.

4. DISASTER RESPONSE, RECOVERY AND REHABILITATION

In order to achieve KPA 4, a number of responses and recovery strategies and contingency plans should be established and implemented when disaster strikes (Van Zyl, 2006:65). Van Zyl (2006:67) suggested the following as effective and appropriate disaster responses and recovery measures:

- Implementation of a uniform approach to the dissemination of early warnings.
- Preventing or reducing the potential impact in respect of personal injury, health, loss of life, property, infrastructure, environments and government services.
- Executing instant integrated and suitable response and relief measures when significant events or disasters occur or are threatening to occur.
- Implementing all rehabilitation and reconstruction strategies following a disaster in an integrated and developmental manner.

Enablers

Three enablers form the core for the framework as they involve communication, the community and money spending in the disaster risk management unit (Van Zyl, 2006:67). These enablers are explained below.

A. ESTABLISHMENT OF INFORMATION MANAGEMENT AND COMMUNICATION

According to Van Zyl (2006:67), this enabler supports the improvement of an information management system and establishment of a well-coordinated communication link between all participants in disaster risk management. Van Zyl (2006:70) suggested that enablers require a system and process that would:

- deliver an institutional resource database, including a reporting and performance measurement facility;
- enable information exchange between primary interest groups;
- enable risk analysis, disaster risk assessment, mapping, monitoring and tracking;

- guide and inform focused risk management, development planning and decision-making; and
- enable well-timed and suitable decision-making to ensure rapid and effective response and recovery operations.

If the above establishment are maintained disaster risk would be minimal, which takes the next focus:

B. PRIORITIES IN EDUCATION, TRAINING, PUBLIC AWARENESS AND RESEARCH

In order to support this enabler, Van Zyl (2006:71) suggested the following functionalities as requirements:

- Education and training programmes pertaining to disaster risk management in all spheres of the education system that must be recorded and monitored.
- A register and records need to be kept of all accredited service providers as well as accredited facilitators to ensure that the minimum standards set by the Sector Education Training Authorities (SETAs) are met.
- Research programmes and projects need to be registered and monitored and the information disseminated to appropriate role players.

These functionalities are essential programmes and must have records of professionals, volunteers, communities and learners for future reference.

C. FUNDING MECHANISMS FOR DISASTER RISK MANAGEMENT

The funding instruments for various aspects of disaster risk management, budgets, applications for funding, approvals and spending, need to be recorded to ensure proper usage (Van Zyl, 2006:72). Every provincial department of agriculture and every municipality should provide for disasters in their annual budget or medium-term framework projections. Should the disaster be of such a magnitude that a provincial department of agriculture or municipality cannot handle it, assistance should be requested from the DAFF who will then approach the National Treasury for post-disaster recovery and rehabilitation.

If these enablers are well-coordinated by relevant stakeholders, they should have the capacity to develop a national disaster management framework that is structured and transparent for South Africa.

3.3.3 National and local drought policy in South Africa

South Africa has devoted a great deal of time and means into developing a unified national drought policy as the efforts were fast-tracked by the development of the National Consultative Forum on drought in the early 1990s (UNISDR, 2007:18). Many stakeholders were called for the planning which resulted in the involvement of more sectors in the process. As stated by UNISDR (2007:18), the efforts led to the development of new drought policies that attempted to inspire risk management, assist farmers financially, protect natural resources, promote the best use of resources for individual farmers and uphold a basis for breeding herd in times of drought.

There are many different stakeholders that target the establishment of awareness of disaster risk reduction measures such as mitigation, preparedness and prevention (UNISDR, 2009:29). The South African government has been guided by these practices as they established drought policies and planning processes over the past ten years that assisted nationally and locally (UNISDR, 2009:29). In 2002, an agricultural risk insurance bill was developed to supplement the income of agricultural producers to those who lost crops or livestock during drought disasters (Wilhite et al., 2005). The challenge for South Africa has been the maintenance of a policy balance between encouraging a risk management approach for the greater agricultural initiatives and provision of a safety net for resource-limited sectors of the population (Wilhite et al., 2005).

The government promulgated the Local Government: Municipal Systems Act, 32 of 2000. The scope of this Act was to give effect to issues of “developmental local government” and to set principles, mechanisms and processes that bring economic and social development of people and communities (South African Local Government Association, 1996). The core components of the integrated development plan for the municipality must reveal the following even during drought according to Municipality System Act, 32 of 2000:

- **Applicability of disaster risk management plans**: As a requirement of the Disaster Risk Management Act, every municipality must include disaster risk management plans in their integrated development plans (IDP). The IDPs must address comprehensive disaster risk assessment, integrated disaster risk reduction, integrated disaster response and recovery, integrated information management and communication, integrated disaster risk management education, training, public awareness and research, and adequate arrangements for disaster management.
- **An assessment of the existing level of development in the municipality which must include the identification of communities who do not have access to basic services**

even during drought: According to the Municipal Systems Act, and the Disaster Management Act discussed earlier, the Ventersdorp Local Municipality was encouraged to identify drought hazards via the Goedgevonden village community participation. It was advisable for villagers to be involved in the risk identification process in order to reduce its future impacts. There was a need to build a culture of prevention and to integrate drought prevention measures in sustainable development policies.

3.4 Principles governing disaster risk management in the agricultural sector

The Strategic Plan for South African Agriculture of November 2001 brought the idea and strategic goals for the agricultural sector in South Africa and has also identified limitations and obstructions posing risks in climate variations and unknown factors (Van Zyl, 2006:75). The unknown factors may include natural disasters, unstable commodity prices including high input costs, coupled with low productivity, poor business strategies and inefficiencies and unfair trade practices by competitors.

There was a need in South Africa to have all-inclusive policy to protect the agricultural sector, rural communities and the economy, particularly against the devastation of disasters, of which drought is the most severe, because the country has commercial and subsistence farming subsectors, national food security side by side with household food insecurity, and sophisticated urban water security (Van Zyl, 2006:75). The three aspects on principles are explained in the following subsections.

3.4.1 Key principles applied in disaster risk management

Van Zyl (20016:75) regard the following as key principles in managing agricultural disasters as guided by disaster risk management described in the National Disaster Risk Management Framework:

- Address important human needs.
- Be driven at all tiers of government.
- Be transparent and inclusive.
- Ensure community involvement.
- Accommodate local conditions.
- Have legitimacy.
- Be flexible and adaptive.
- Be efficient and effective.
- Be affordable and sustainable.
- Be needs oriented and prioritised.

- Involve other sectors.
- Have a multidisciplinary and integrated approach.
- Focus on key issues.
- Be practical.

3.4.2 Basic elements of disaster risk management in the agricultural sector

It is imperative that the risks involved in the agricultural sector are considered appropriately so as to manage them. The basic elements were distinguished by Van Zyl (2006:75) as follows:

- Disaster assistance must encourage and provide incentives for agricultural producers, local authorities and other water-dependent sectors or groups to adopt appropriate and efficient management practices that help to alleviate the effects of disasters, especially drought.
- Disaster assistance must be provided in the form of technical and relief measures, financially or otherwise.
- All drought relief agencies should coordinate their efforts to establish an accessible pool of knowledge and experience on drought relief.
- Disaster assistance must be provided in an equitable, consistent and predictable manner without regard to economic circumstances, industry or geographic region.
- Effective communication must be promoted among all parties concerned. It is of utmost importance that all parties involved are committed to cooperation and promoting of confidence in each other.
- During severe drought conditions, prompt relief must be readily available and should be implemented with utmost speed and efficiency.
- Those at risk must know exactly what to expect from government during drought or other agricultural disasters in order to be better prepared to manage risk.
- The creation of permanent structures (including infrastructure and human resources) capable of providing streamlined and effective coordination, and to ensure continuity in the ongoing process of reducing vulnerability to recurrent drought-related crises.
- The strengthening of rural community capacity through an education and research scheme, thereby reducing their vulnerability to disasters, especially drought.
- Promoting a general acceptance of the drought management strategy for the agricultural sector to minimise resource degradation and the vulnerability of the sector to drought.

- An appropriate water supply system must be installed and maintained in the developing regions to reduce dependency on highly vulnerable water sources such as seasonal rainfall, springs and river flow.
- The development backlog of water provision systems in most of the rural areas should be addressed with urgency as water provision has proved to be one of the first and most critical drought impacts on rural communities.
- The adequacy of water reserves is an early indicator of vulnerability to drought, and is a situation which should be constantly monitored, and be available on a GIS database. The primary responsibility for the design, implementation, application and maintenance of these systems should be that of DAFF.
- The development and updating of procedures for the effective communication between all role players of information on the nature of available relief schemes and the procedures for the accessing thereof by all members of target communities.
- Existing infrastructure must be extended and reconstructed where needed, to enable utilisation thereof for immediate relief actions. Procedures to access resources, activate operations and second personnel, must be specifically defined for drought relief actions with emphasis given to speedy implementation.

3.4.3 Early warning and monitoring system

The NDMC needs to rely on a line function department in respect of drought, for instance DAFF, with the necessary expertise to assemble data and develop and maintain systems (Van Zyl, 2006:77). Early warning and monitoring systems that focus on agriculture are important to evaluate the susceptibility of the sector, particularly to drought, the range of support, if any, required maintaining a practical production sector and the extent to which national food security could be affected by drought. An early warning system recognises the need for a people-centred warnings system and it requires clear, concise and consistent signals with simple messages (Leonard et al., 2008). Leonard et al. (2008:205) further articulated that an effective warning system message should:

- be focussed on people at risk;
- be capable of reaching people, irrespective of what they are doing;
- be easy to access and use;
- not create added risk;
- be reliable;
- provide appropriate lead times so people can have a chance to protect themselves; and
- generate an authenticate message (Leonard et al., 2008:205).

The monitoring schemes should punctually provide data on nutritional states of vulnerable groups, health status and employment status of groups involved in drought-sensitive industries such as agriculture so that the support is provided timeously (Van Zyl, 2006:78). Van Zyl further stated that the nutritional status of the population and the household food security of the needy should be designed to provide coverage of all areas of South Africa. Bruce et al. (2006) mentioned that the national agricultural monitoring system website can also be used to rationalise the exceptional circumstances by producing reports with a complete set of contextual, climatic, production and economic analyses.

Meshing of systems in an appropriate manner will ensure compatibility, and the NDMC will be able to monitor the level of maintenance and adequacy of the different early warning and monitoring systems (Van Zyl, 2006:78).

3.5 Agricultural drought management plan

The ADMP has a long-term vision as it was introduced by DAFF with the aim of reducing the risk of drought through an effective and joint drought management system (RSA DAFF, 2010). The focus was aimed at livestock, crops, price, animal husbandry and income systems that are easily affected by drought incidents and those that decrease the application of natural resources.

It is significant to recall that drought is a temporary irregularity, unlike normal arid and semi-arid climatic conditions and one needs to differentiate between drought and waterlessness (World Meteorological Organization, 2006). Comprehending the distinction between the two is essential for development of drought risk reduction plans that are created from assessment of drought risk (World Meteorological Organization, 2000). Farmers should know that weather fluctuates from wet periods to dry periods and they should familiarise their agricultural activities to adapt to the two climate extremes (Intergovernmental Panel on Climate Change, 2001). The climate profile in certain years might experience above normal rainfall with potentially above normal production, while below normal rainfall in other years might lead to lower normal or average production yields (Intergovernmental Panel on Climate Change, 2001). Nonetheless, this does not always happen as in the case where there are good agricultural practices, it is likely to receive the same earnings during dry years as well (Olivier, 2001).

The ADMP established four principles which are outlined as follows:

- Establish a communication line for information sharing and management, monitoring and evaluation of drought episodes to find the causes of drought and social vulnerabilities

caused by the impact of drought. Also, recommend new ways to mitigate the effect of the drought.

- Make use of drought monitoring maps to compile and update the management tools of drought.
- Maintain and implement the early warning systems as part of drought monitoring tools.
- Advance and implement projects and programmes that focus on drought risk reduction, mitigation, preparedness, response, reliefs, recovery and rehabilitation (RSA DAFF, 2010).

The ADMP highlighted that DAFF has a management role to play in reducing the impact of drought on the society. Below are the roles and responsibilities to reduce drought impact:

- Establishing and updating of a consolidated ADMP.
- Creating, operationalising and updating drought management policies and projects.
- Making funds available for drought episodes.
- Sharing decisions on new drought policies and services with other sector departments.
- Assessment of the impact of a drought phenomenon on sustainable development in the agricultural sector.
- Doing assessments with provincial officers on drought risk.
- Coordinating early warning communication lines.
- Coordinating of disaster relief schemes.
- Outlining the procedure of drought assistance.
- Funding drought relief programmes from the National Treasury during drought relief schemes with the National Disaster Management Centre.

Consequently, it is essential to deliberate on establishment plans that are important for drought management.

3.6 Conclusion

Drought resilience requires important policy establishment in the country in order to reduce human and environment sufferings, hence the Disaster Management Act, Act 57 of 2002, was introduced. The discussion in this chapter has highlighted the evolution of the drought policy in South Africa as a means to show the recommendations which were made by drought investigation commissions during 1914 to look at impacts of drought at that time. It reflected the drought trends of centuries back so that the present policy makers can make informed decisions regarding drought in South Africa. Every citizen has the right to have water, health and social security, hence the policies act as guiding instruments to support and assist all the

stakeholders who are engaged in minimising the risk of drought. The NDMF with its four KPAs and three enablers were implemented by the South African government to reduce disaster risk and the severity of disaster. Legislations were developed so as to move away from a drought crisis management approach to improved emphasis on climate risk management and a proactive drought risk reduction management approach. In the next chapter the emphasis will be on research methodology.

Chapter 4
Research Methodology

4.1 Introduction

This chapter focuses on the research method applied in this study to assess the socio-economic impact of drought in the Goedgevonden village in the Ventersdorp Local Municipality of the North West Province of South Africa. The chapter consists of a discussion of the research design and the procedures followed in conducting this study such as sampling, data collection tools, data collection procedure, and data analysis required in the field of this research. The study used qualitative research methods for data collection and a questionnaire designed for the community members of Goedgevonden village is provided.

4.2 Research design

Research design refers to the means by which the researcher plans and structures the research process (Babbie and Mouton, 2001). Brynard and Hanekom (2006:35) argued that research design can be defined as the way in which a reseacher gathers and processes data within the limits of a proposed framework for the research process. This means that a research question needs to be formulated and the evidence is needed in order to respond to the question in a convincing manner. Babbie and Mouton (2001) shared the same view as they saw research design as addressing the question on what type of study is being undertaken to provide acceptable answers to the research problem or questions.

Hence, Struwig and Stead (2001) suggested that the most common methods applied to conduct quantitative research are the exploratory, descriptive and quasi-experimental methods. On the other hand, Leedy and Ormrod (2001) believed that qualitative data has two aspects: first, the focus on phenomena that occur in natural settings, and secondly, the study of those phenomena in all their complexities. The qualitative data method applied was designed to discover what could be learned about the phenomenon of interest which was the socio-economic impact of drought in the Goedgevonden village. Data for open-ended questions was qualitatively summarised into content paragraphs.

A qualitative research design was designated as the approach of assessment for the purpose of this study.The design allowed the researcher to explore and understand the occurrences from both the perspective of the literature and the participant's point of view using data collection instruments (Leedy and Ormond, 2001). According to Creswell (2003), it applies strategies of inquiry such as descriptives and phenomenologies grounged theory studies.

Open-ended emerging data with the primary determination of developing themes are collected by the reseacher.

Under qualitative research, a researcher applies a primary instrument, uses different data gathering tools, and applies an inductive approach to data analysis (Bryman, 2002). The qualitative research method was applied in this study to gain an understanding of the behaviour and attitudes of the Goedgevonden village community members with regard to the socio-economic impact of drought during the period 2014 to 2015.

Quantitative research was also applied in this study. Quantitative research in contrast to qualitative research is characterised by a respondent sample that yields information that can be summarised through statistical analysis (Struwig and Stead, 2001). Quantitative research requires that the data is collected to be expressed in numbers, that is, they can be quantified. For this study, the quantitative data was presented in the form of tables, figures of graphs and pie charts as means to analysis the data. The combination of the two approaches in this study supported exploring, explaining, describing and interpreting the socio-economic impact of drought in Goedgevonden village and the community' s response to drought hazard.

There was a close connection between the researcher in this study and the object being researched, which was the socio-economic impact of drought in the Goedgevonden village. It is for this reason that the researcher used the data collection tool, the questionnaire, which assisted in eliciting information from the community members in providing the understanding of and knowledge about the phenomenon under study.

The research design did not use a laboratory to complete the survey; instead the design forced the researcher to go and engage directly with the Goedgevonden village members. For this study, the researcher collected data directly from the Goedgevonden community and at the same time observed participants in their real-life situation. All data collected from the field was analysed and combined with literature to formulate an interpretation about the socio-economic impact of drought in the Goedgevonden village.

4.3 Research methodology

Research methodology first deals with "what scientific knowledge is" and secondly "which methods to apply or to follow" to obtain scientific knowledge (Coetzee, 2001). According to Coetzee (2001) the word 'methodology' refers to how to move from point A to B, that is, how to get from the starting position to the point where scientific knowledge is achieved. Research methodology is perceived as the planned arrangement of the process involved in conducting

research, given immense variability in their different paradigms, operations and the interaction that takes place (Cahill, 1996).

According to Stenbacka (2001), methodology places the reseacher in the empirical world and connects him to particular sites, people, institutions, physical places and bodies of relevant interpretive materials that include documents and records. Stenbacka (2001) added that methodology seeks to address the general planning of the research process, strategies and data collection techniques.

As this study sought to determine the socio-economic impact of drought in the Goedgevonden village, a questionnaire was used as the primary source of data collection. Using a questionnaire brings quick results and was convenient for this study as the Goedgevonden village community had similar socio-economic charateristics. Babbie and Mouton *(*2001:233) defined a questionnaire as a collection of questions. They pointed out that a typical questionnaire might probably contain many statements as questions, especially if the researcher is interested in determining the extent to which respondents hold a particular attitude or viewpoint on an event.

4.3.1 Target population

'Population' is defined as "a well-defined group of human-beings or other entities" (Chikoko and Mhloyi, 1995:73). Best and Kahn (1993:3) defined population as "any group of individuals or entities that have one or more characteristics in common, which are of interest to the researcher". Having this definition in mind, one can suggest that population is a group of human beings or entities that the researcher has a specific interest in. In this regard, the target population is the actual population which the researcher would prefer to generalise. The community of the Goedgevonden village had a population of 4 934 people which were targeted for this study (Stats SA, 2016). The following section describes sample and size that will indicate how and why the households were selected.

4.3.2 Sample, sample size and procedure

As stated by Brynard and Hanekom (2006), sampling is the method applied by an investigator to select a small group of people or entities from a larger population that has similar characteristics and comprehensive information for a planned survey. Maree (2007:79) shared the same view and stated that sampling refers to the processes applied to select a portion of the population for a study. This is significant as individuals are selected from the larger population group. Nevertheless, Bless and Higson-Smith (1995) claimed that of significance in sampling is to determine samples that best represent a population as to allow a precise generalisation of the results.

Sampling depends on how heterogeneous or homogeneous the population is (Bless and Higson-Smith, 1995). In this study, a smaller sample was required as Goedgevonden had a population with similar socio-economic characteristics (Stats SA, 2016).

A sample is defined as part of the individuals that are selected to participate in the incident, while a population can be defined as the entire group that meets the specific conditions of a specific study (Polit and Hungler, 1983). For the purpose of this study, as the Goedgevonden village community had similar socio-economic characteristics, 87 households from 783 households of the entire Goedgevonden village were randomly selected. Each household had about six members as observed by the researcher during a visit to the Goedgevonden village in 2016. The sample size was limited because of the time and resources available to conduct the survey as well as the fact that the community had similar socio-economic characteristics.

4.3.3 Data collection

There are various ways to collect data and various collection tools are designed based on the aim of the study (Struwig and Stead, 2001:98). According to Schutte (2006:158), more than one data collection tool can be applied in one study. Data collection involved visiting the sampled households in the Goedgevonden village to collect data about the socio-economic impact of drought. For this study, a well-designed questionnaire was used to solicit the socio-economic impact of drought in the Goedgevonden village (See Appendix 1).

4.3.4 Data collection tool

For this study, a structured questionnaire data collection tool was used. A questionnaire has some advantages as it cut costs; it produces results quickly and is best for a stable, sound and uniform measure without disparity, as well as the fact that it covers a wider array of issues (Maraj, 2000). Five research assistants, after receiving training in terms of administering the questionnaire and how to communicate or ask participants questions, were utilised to collect data in the Goedgevonden village. These assistants were selected on the basis of their academic standing (grade 12 certificates) and being community members of the Goedgevonden village.

4.3.5 Questionnaire

A questionnaire is a list of questions, which strives to gain data from the respondents to answer certain laid down research objectives. The questionnaire was viewed as the fundamental of the research process that required cautious production and planning of questions concerning the phenomenon under study and the questions were probed to respondents during the interview process (Finn et al., 2008).

Questionnaires were filled in by the Goedgevonden village community members who were sampled for this study. A questionnaire which had the name of researcher, institution, student number and purpose of study was used to put respondents at ease. Hague (1993:14) argued that the questionnaire is applied as tool to translate the information directly given by a person, who is the subject of the study, into data. It facilitates measuring of what a person likes or dislikes and what a person thinks or knows about a specific matter. Hopkins and Antes (1990) mentioned that a questionnaire offers a way to collect personal information from a subject that may not be readily accessible by using other methods.

As stated by Maraj (2000), a questionnaire has the following advantages: it can be delivered by hand to respondents and collected, instead of using postage services; it brings quick results depending on the availability of respondents; it is a convenient data collection method; anonymity is guaranteed; and it covers a wider range of issues.

A structured questionnaire was developed based on the objectives of this study and included both open-ended and closed questions. Structured questions have pre-defined answers where the respondent has little autonomy to go astray and these are seen as the basis of qualitative surveys (Hague, 1993).

The following sections form the summary of the core on the development of the questionnaire for this study in the Goedgevonden village:

Section A: Demographic information

In this section, the researcher sought to gain information on the background characteristics of the Goedgevonden village community members, which were believed might bring relevancy to this study. These characteristics included gender, age, and educational level. The demographic information from the Goedgevonden community would assist in ensuring that respondents from different gender, age and educational background had a say in a questionnaire so as to minimise unfairness on the part of respondents.

Section B: Social impact of drought

In this section, the researcher sought to assess the effects of drought on health, social cohesion, and schooling of the Goedgevonden community. The questionnaire tried to evaluate whether the community members were warned about drought before onset and whether they had access to clean drinkable water or not in the Goedgevonden village.

Section E: Economic impact of drought

In this section, the researcher sought to determine how the livelihoods and income of the respondents were affected by the drought in the Goedgevonden village. The questions evaluated the impact of drought on crops and livestock and the extent in which community livelihoods in the Goedgevonden village were affected.

4.3.6 Data analysis

Data analysis is the process of shaping and breaking data into controllable units, synthesising it, searching for what is essential to be learned and to determine what to express to readers about the research (Bogdan and Biklen, 2003:145) According to De Vos et al. (2005:333), data analysis is the process of transforming data collected in a manner that can reduce a bulk of raw information into structured meaningful data. Henning et al. (2004) saw data analysis as the finest manner to evaluate whether the proof collected supports the initial proposition of the study. Gibbs (2007) also agreed that data analysis is the process where the researcher gathers more information, then follows stages of processing it into understandable themes that can offer a reliable and insightful analysis. In this section, the data collected was analysed using pie charts, graphs and tables.

4.3.7 Validity and reliability

Validity of the study is the means of determining whether the study truly measures that which it was intended to measure or how truthful the research results are (Hoepfl, 1997). The research instruments used need to allow the researcher to achieve the objectives of the study. Credibility is one of the most essential factors in establishing the trustworthiness of the investigation.

Reliability is the extent to which results are consistent over time as an accurate representation of the case selected for the study. This means that if the research results can be reproduced under a similar methodology, then the research instruments are regarded as reliable (Henning et al., 2004). Lincoln and Guba (1985) supported this argument as they believed that in order to deal with the reliability issue more directly, the process within the study should be reported in full. This would enable future researchers to repeat the work or to achieve the same results. In this study, the researcher tried to ensure that the reality within the context in which this study was done would not be distorted. The research tool, questionnaire, as approved by the University of Free State, ensured that the research would measure that which it was intended to measure. Data obtained by the researcher was compared with the information obtained from the literature review.

4.4 Research ethics

Bless et al. (2009:1400) argued that ethical policies will protect individuals or group rights and emphasised that it will help prevent research abuse and assist investigators in understanding their responsibilities as ethical scholars. There must be a joint arrangement, collaboration and accepted promises amid all stakeholders before accessing information from the participants (De Vos et al., 2011:114). The rights of respondents were respected and that included protection of secretive information. The participants in the questionnaire were at the discretion of the respondents and this was explained to the respondents before the responding to questionnaire. The survey follows the commonly acknowledged principles regarding beliefs and moral values.

Permission had to be granted by the Dr Kenneth Kaunda District Municipality as well as the Ventersdorp Local Municipality to conduct the survey in the area. The consent forms that were dictated by ethical norms outlined the research purpose and assured all participants that the information they provide would purely serve for the purpose of this study and their contributions would be highly appreciated. Permission for data collection using the consent form was granted by the University of the Free State Research Information Management System.

4.5 Conclusion

The chapter highlighted the research methodology on the socio-economic impact of drought in the Goedgevonden village. The questionnaire was the chosen tool for attaining the data from the community of the Goedgevonden village. The data collected would assist in accomplishing the objective of solving the socio-economic impact of drought in the area of study. The subsequent chapter will focus on data presentation and analysis of the results of this study.

Chapter 5
Data Presentation, Interpretation and Analysis

5.1 Introduction

The results of the study are presented, interpreted and analysed in this chapter. A total of 87 questionnaires were successfully completed by participants. This is what was initially intended and it was thus a 100% success rate. The sampling and data collection process went well, despite some delays that were experienced where some household members were not available at home and the team was forced to revisit those households. The questionnaires were coded and the data was entered on an Excel sheet for the close-ended questions. The open-ended questions were captured in a MS-Word document and analysed in thematic form as will be discussed below. Pie charts, bar graphs and tables are forms in which quantitative data is presented on this chapter.

5.2 Data presentation and analysis

The data will be presented in the following sections, representing demographic information, social impacts of drought and economic impact of drought.

5.2.1 Demographic information

The demographic information provides an overview of the demographic profile of the 87 respondents. The demographic and socio-economic characteristics are essential, because they influence the household economic behaviour. This section of the questionnaire covered the respondents' gender, age, marital status, education, family size, number of years in area and the income in relation to education. The information is significant to determine any variable that might affect the results. The demographic data helped to contextualise the findings and the formulation of appropriate recommendations to the socio- economic impacts of drought of the Goedgevonden community.

TABLE 5.1: GENDER

Gender	Total Number	Percentage
Male	32	37
Female	55	63

Source: Survey results (2017)

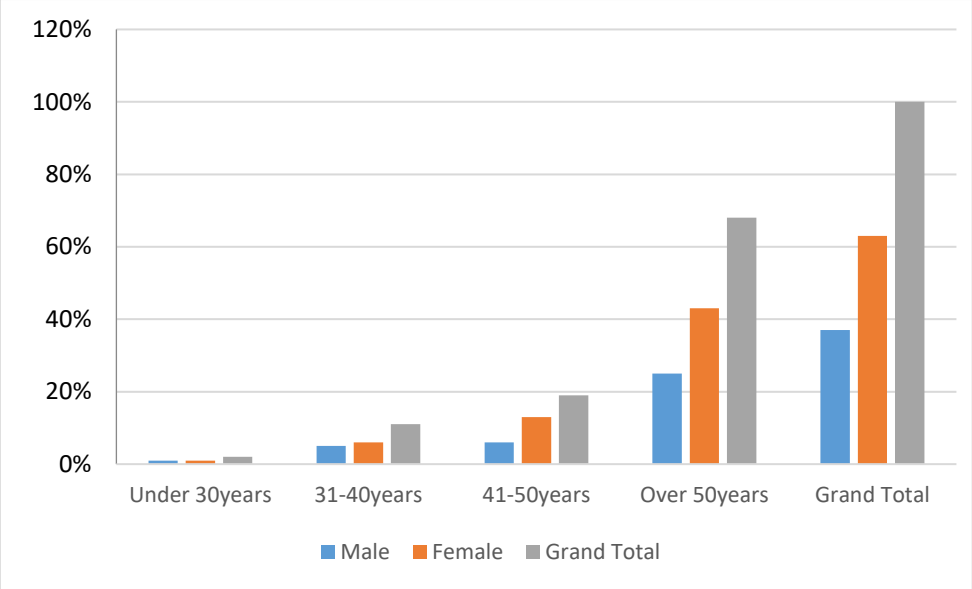
A total of 55 (63%) respondents were female and 32 (37%) of them were males. The higher number of female respondents in the study could have been because it was during the week

and most men had gone out to fend for the families. Some of the women indicated informally that their husbands were not residing in the area due to work commitments. The males that participated were locally based as their livelihoods were determined by the activities in their environs. However, the population figures of South Africa indicate that there are more women than males and this was also not surprising that more women participate in the study. Since this is a black area the patriarchal impact is felt as men are to fend for their families and women have to stay at home and take care of domestic chores. These domestic chores include tilling the land. Hence, the women were the ones involved in farming in this area. In Turkey, the technical knowledge was mainly controlled by men of which such mentality was criticised as being imperfect, since it led to mismanagement of resources such as land, water and female labour (Morvaridi, 1992). The division of labour by gender results in an imbalance since women participations in the agricultural production process brought greater significance as crop cultivation has grown in Turkey. The same is happening in rural villages of South Africa as women start to take an active role in agriculture as men are working elsewhere.

Poverty was high in the former white area of Goedgevonden village. Farm labourers, in particular, were faced with absence of economic prospects and access to basic services like water. These conditions provided a context for the risk and exposure of the poor to the impact of drought vulnerability. The other reasons might be that the female respondents were more than men as men might be out of home or village because of work, while women remained at home to look after the household affairs, as commented by some respondents. Some women experience worse times when their husband dies, because they become subordinates to and rely on their headmen for help in times of problems and when they are in need and they are not allowed to own land. The rise in the number of women in decision-making positions could be attributed to the influence of projects that promote women empowerment. Women, as suggested by Yavinsky (2012), make up the majority of the world's poor population and were found to be more dependent than men on natural resources for livelihoods. The same apply to the Goedgevonden village, as more respondents were women. Most economically active men were working in neighbouring towns, which left women and children vulnerable as they had more physical work to do.

The use of women in farming operations was in most cases in subsistence farming, and substance farmers are more severely impacted by drought than commercial farmers (Reynolds et al*.,* 2001). The commercial farmers may have insurance to cover them during hazards. Commercial farmers are also members of farmers' associations that provide information of any eventuality (Mortimore and Adams, 2000). The subsistence farmers often come from previously marginalised communities and they have never been exposed to

commercial markets as their operations are on providing for food security and diversifying income for the household (Alston and Kent, 2004). As a result, women are vulnerable to the impact of drought in the Goedgevonden community as the majority of respondents were women and the farming that is practised in the area is subsistence, therefore the conditions are not conducive during hazards. Some of the women suffered the most because they were the heads of the households; they had to do the household tasks, support their children, fetch water and provide food for their families.



Source: Survey results (2017)

Figure 5.1: Age of respondents in relation to gender.

Only 2% of the respondents – one female and one male – indicated that they were 30 years or younger. A total of 11% of the participants aged between 31 and 40 years and only a slight difference in gender, namely 6% female and 5% male. On the other hand, 19% of the participants were between 41 and 50 years, with 13% male and 6% female. The majority of the respondents in this survey were more than 50 years old as 68% of the respondents were reflected in this category. This included 43% female respondents and 25% male respondents.

The literature showed that the production age or working age was found to be between 15 and 64 years, while the age dependency ratio is the ratio of dependents which are younger than 15 and above 64 years old (Organisation for Economic Co-Operation and Development, 2017).

The research showed that most of the respondents were mature community members and they had substantial experience of drought in their lifetime in the area and their contribution can be of great value. The experienced farmers have accumulated sufficient information on

weather patterns over a period of time and will therefore be able to adopt appropriate measures to address changing weather patterns. The cross-pollination of ideas and skills of participants (male and female) helps to achieve multiple livelihoods outcomes (UK DFID, 1999). Studies showed that the greater the experiences in farming, the more likely farmers are to have a good knowledge about the weather and climatic conditions and have thus acclimatised. The indigenous knowledge on issues dealing with drought forecasting and early warning system can play a significant role in assisting the community of the Goedgevonden village, as the age of respondents is vital.

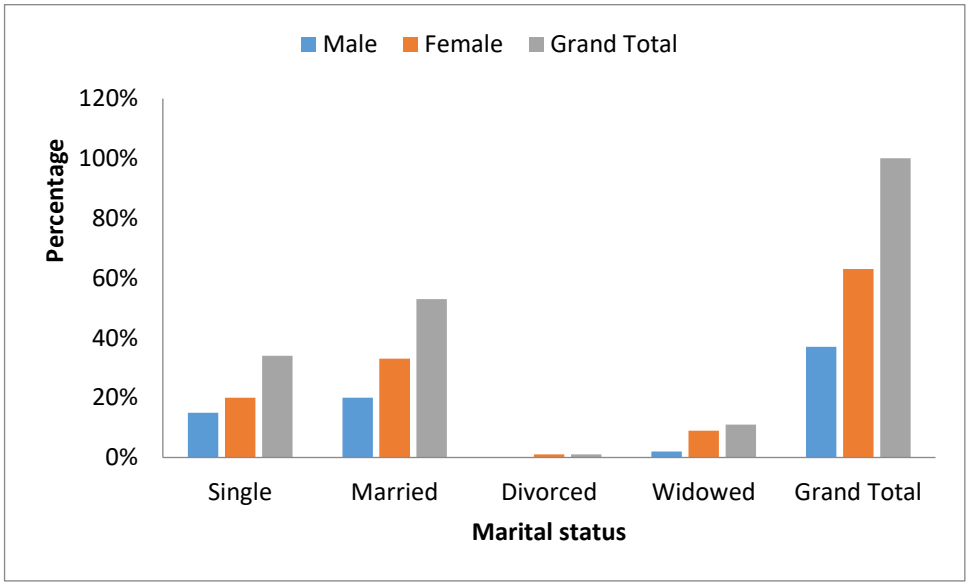


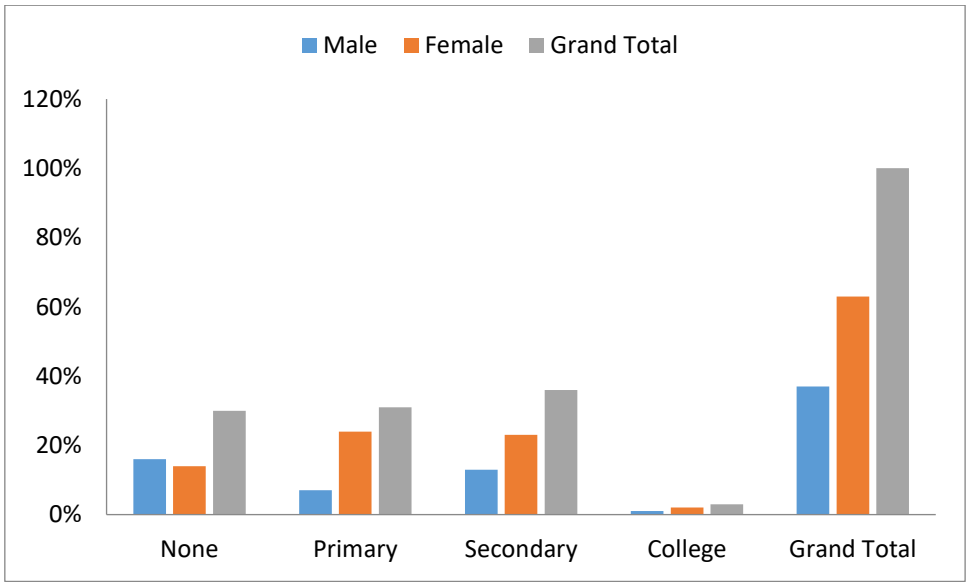
Figure 5.2: Gender and marital status tabulation. Source: Survey results

Looking at gender and marital status, a total of 35% of the respondents were single household members. This represented 15% male and 20% female respondents. This can have a negative socio-economic impact, as there can be a poor support base during drought. Single household members may experience a series of emotions related to drought that include feelings of being out of control and at the mercy of weather, fear of lack of finance to provide for family, social isolation and sadness associated with different losses like farmland, crops and livestock (Grant et al., 2004).

In the case of married respondents, 53% was reflected as being married and this was useful for the study as married couples are likely to have varied sources of income that can support the household to survive and recover quickly on drought occurrences. Partners can help each other during difficult times such as drought, by providing an income, sharing responsibility, understanding each other's concerns, fears and reasoning. Families that are committed are

willing to invest time and energy in family activities that will make families cope better with the situation.

Divorced and widowed respondents have low percentages, namely 1% and 11%, respectively. The literature showed that those who are widowed are more vulnerable to socio-economic impacts, as they do not have enough support bases during distress. Men are not there to supplement income and other sources of livelihood; hence, the widows became more vulnerable. As suggested in the literature on SLF, social capital plays a vital role as it can provide a buffer that could help a household to cope with blows such as death in the family (UK DFID, 1999). The social capital may include features such as family, age group, and gender (Kollmair and Gamper, 2002). Hence, the community in the Goedgevonden village lacks established social groups to assist during drought periods.



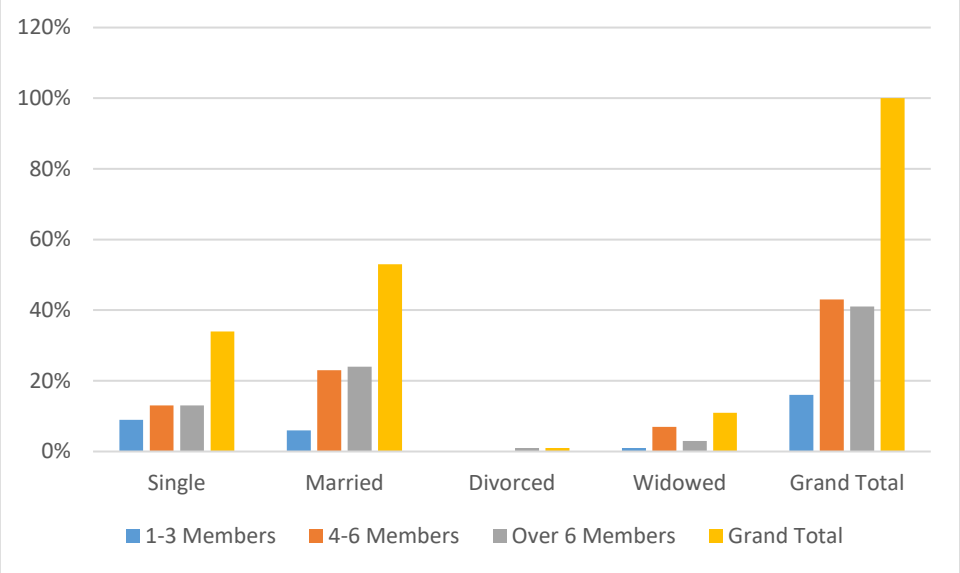
Source: Survey results (2017)

Figure 5.3: Education and gender relation

The results shown in Figure 5.3, illustrate a two-way contingency reflecting a comparison between education and gender relations. A total of 30% of the respondents had no education, showing 16% and 14% for males and females, respectively. This group of respondents had to rely on indigenous knowledge to mitigate the drought situation as commented by one community member during the visit. A total of 31% of the respondents had primary education as the responses reflected 7% and 24% for males and females, respectively in this range. Respondents with secondary education made a total of 36%, with 13% and 24% for males and females, respectively. A very small percentage (3%) of the participants made it to college. This reflects that even though the participants did not go far with education, many have

managed to reach secondary school, which should enable to make informed decisions regarding farming and dealing with drought.

The statistics reflected in Figure 5.3 was for the household heads only, and did not include children that were younger than twenty years of age. Looking at the reflection of the results, households with no formal education might not be able to read and write, which tends to limit their capability to access useful information about drought and these will increase their vulnerability. One can suggest that it is important for local government and non-government structures to bring about awareness of any imminent disaster in the Goedgevonden village. The households can apply various approaches to deal with livelihoods as long as the objective is geared towards creating income security and well-being during hazard situations (Adato and Mainzen-Dick, 2002:8).



Source: Survey results (2017)

Figure 5.4: Family sizes in relation to marital status

The results shown in Figure 5.4 have a total of 35% of single family members, reflecting 9% (with 1−3 members), 13% (with 4−6 members) and 13% (with more 6 members). Single-family members had the second highest percentage (35%), where family size increases from 4−6 to more than 6 family members. This can work as support structure because members may assist one another with food supply during drought.

A total of 53% was indicated for married family members, with 6% (with 1−3 members), 23% (with 4−6 members), 24% (more than 6 members). The family size of married members had a high percentage of 53% among all the categories. Married family members had the highest family size of 4−6 and more than 6 family members. In the literature, it was suggested that the human capital constitutes the quality and quantity of the workforce that is available as human

capital to enable the family to pursue different livelihood strategies and achieve their goals (UK DFID, 1999). A strong family structure is built on members who are married unlike in those who are single, divorced or widowed because family members can assist one another socially and economically during drought.

Only 1% of the divorced family members fell in the category of over 6 family members. Respondents from this category will be vulnerable during drought as the support system is poor and the situation could result in making them suffer. Lastly, the widowed family members had a total of 11%, which had 1% (with 1−3 members), 7% (with 4−6 members) and 11% (with more than 6 members) as reflected in Figure 5.4. The members who fell within this category would also vulnerable during drought as one of the family support structures was no longer there to assist the family. Drought episodes aggravate the situation to these families because the support structure is lacking.

It can be suggested that households with one or more salaried members would have a firmer income than those relying only on agriculture. Equally, households with self-employed members were more likely to have a higher and firmer income. In the literature, Kollmair and Gamper (2002) also suggested that the human capital constitutes the quality and quantity of the workforce that is available as human capital to enable the family to pursue different livelihood strategies and achieve their goals. It can be concluded that the same would apply in Goedgevonden where the family size in couples who are married, would be higher and this would enable the community members to be resilient in times of drought as families support each other in performing different functions to make a living for the household.

TABLE 5.2: NUMBER OF YEARS IN THE AREA

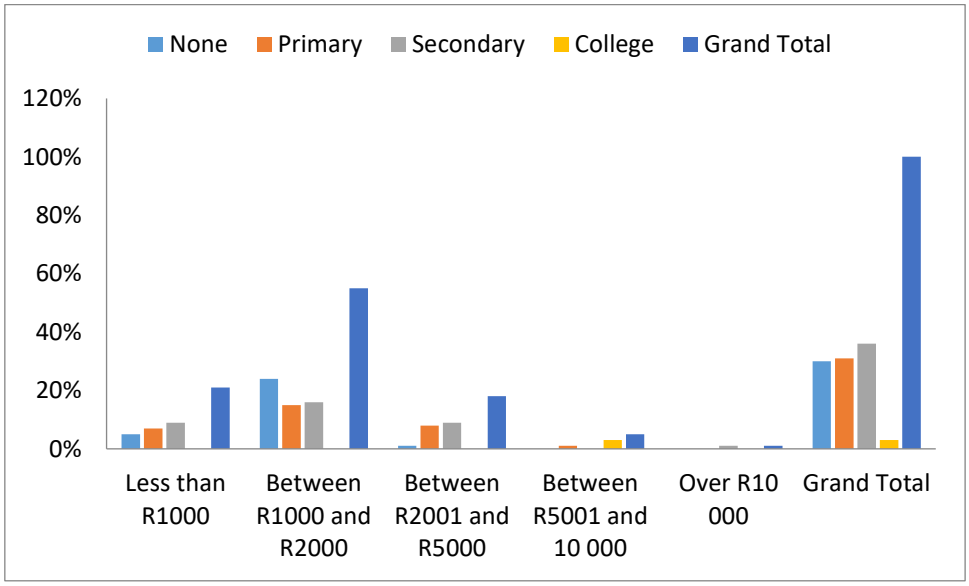
Years in area	Percentage
0−10	10
11−20	39
Over 20	51
Total	100

Source: Survey results (2017)

The results in Table 5.2 show a total of 51% of respondents who have stayed in the area for more than 20 years, which portrays a good response as it provides relevant information regarding drought impact in the area. Participants falling in the 11 to 20-year brackets made up 39%, which is the second largest share on the pie graph. Only 10% of participants have stayed in the area for less than 10 years. Their knowledge of the area might be limited as compared to other year brackets, but their contribution is also important. The number of years is vital as indigenous knowledge can play a significant role in mitigating drought in the area.

Those who stayed in the area for lesser years would be highly affected by drought as they would not have enough experience to mitigate the situation.

The longer the respondents had lived in the Goedgevonden village, the better knowledge they had to deal with the situation as stated during the interview by one elder who had livestock in the village. It was suggested in the literature that the significance of natural capital as the provider of all forms of sustainable life (human life), should ensure the provision for present generations with the future in mind regarding resource usage (Jayne, 2001). It can be concluded that the Goedgevonden community members who had lived in the area for many years had a better understanding of the concept of sustainable resource usage and were able to mitigate the situation better than those who had lived in the area for only a few years.



Source: Survey results (2017)

Figure 5.5: Income in relation to level of education

Figure 5.5 shows the income in relation to level of education. The respondents who earned less than R1 000 reflected a total of 21%, where 5% had no educational background. Respondents with primary and secondary education in this range reflected 7% and 9%, respectively. Figure 5.5 shows a total of 55% of respondents who earned between RI 000 and R2 000. The respondents who dominated this category had no education (24%). They are followed by respondents with primary education and secondary education that reflected 5% and 16%, respectively. Respondents who earned between R2 001 and R5 000 had a total of 18%, of which 1% is reflected by respondents without education, 8% and 9% are reflected by respondents with primary and secondary education.

Respondents who were in the income category between R5 001 and R10 000 were a total of 5%, of which 2% and 3% were respondents who had primary and college education,

respectively. Only 1% of the participants had an income of over R10 000 and these respondents had secondary education. As demonstrated above, the majority of the population of the village earned between R1 000 and R2 000 a month. Most of the respondents were subsistence farmers where some of them had secondary education, and as they experience drought, it becomes difficult for them to survive because they do not have enough skills to deal with the situation, as one respondent mentioned during a visit to the area. It can be deduced that the number of years of education of the household head is important and can be positively linked with household income. It is clear that the differences in educational attainment could become significant during drought years because non-agricultural wage income can be used to smooth crop income losses due to drought. Households with members involved in off-farm activities can have a stable income source that can make up for losses in crop production during drought episodes.

It should be noted that a lack of money is a greater sign of poverty than its cause, and in most cases the poor are not without an income, but what they lack is the ability to accrue possessions, which is a key component to the creation of wealth and breaking the poverty cycle (United Nations Economic Social Commission for Asia and the Pacific, 2000). The findings advocated that the education levels increase the section of people's income levels, and that access to income can assist to mitigate poverty and minimise drought risk and socio-economic impact on the society. The salary ranges depicted the socio-economic problems that the Goedgevonden community had in the area and affordability of activities related as result of drought would be experienced by community.

5.2.2 Social impact of drought

There are several impacts that are aggravated by drought. Drought can change the normal activities of the community that depends on the natural environment to produce food and earn an income (Vogel et al., 2000). Effective natural hazard prevention and mitigation require dealing not only with hydrological or meteorological factors, but also the social factors that have an influence on communities (White and Howe, 2002). Wilhite (2005) argued that social vulnerability to the impact of drought is escalating at an alarming rate on the globe and in South Africa. Goedgevonden village is not an exception in this regard. The activities that are part of this section are reflected below and analysed through tables and figures regarding the social impact.

TABLE 5.3: IMPACT OF DROUGHT IN THE AREA

Respondents' choices on impact of drought		Percentage
1.	Drying of water sources (rivers, lakes, dams, boreholes)	83%
2.	Drought drying surroundings (environment)	18%
3.	Famine	15%
4.	Crop failures/poor crop quality	34%
5.	Loss of livestock	44%
6.	Poor health of livestock	34%
7.	Food price increase	55%
8.	Decline in livestock prices	37%
9.	Other impact on livelihoods	3%

Source: Survey results (2017)

Respondents were allowed multiple responses on this question and the majority (83%) of the respondents experienced the drying of water sources. The results showed that the community suffered a great deal where 55% and 44% are reflected for an increase in food prices and the loss of livestock, respectively. The respondents had limited percentages on "other impacts on livelihoods" as shown on the table as it reflects only 3%. Famine and drying of the environment reflects 15% and 18%, respectively. These affected farmers as there were not enough grazing for livestock. Poor health of livestock (34%), crop failures (34%) and the decline in livestock prices (37%) were other aspects that affected them.

Drought is a shortage of precipitation over a certain period that brings water deficiency that leads to adverse conditions on vegetation, people, animals and environment within a zone of geographical space (Van Zyl, 2006). This statement can be supported as the community of Goedgevonden suffered more on water shortage for domestic purposes, crops and livestock which left the community devastated.

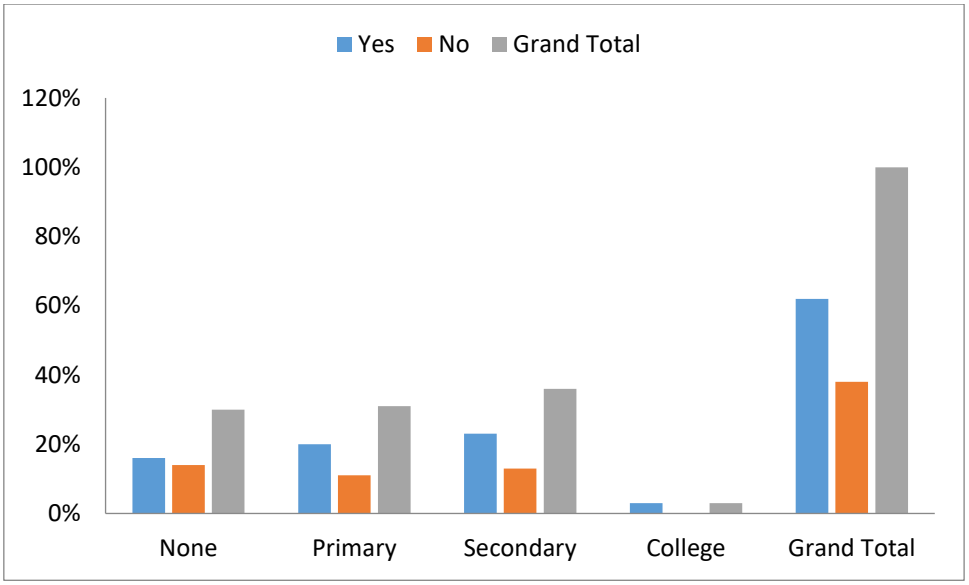
The community members also stated that the drought brought the escalation of food prices that made life very difficult for them. Drought episodes could cause a rise in food prices that would lead to malnutrition and hunger on the side of the low-income groups whose income cannot afford rising food prices (Chabane, 2004). The reduction in crop income as result of an increase in days of drought in the Goedgevonden village has contributed to a decline in total household income among those affected by the drought. The literature supported what really happened in the community of Goedgevonden village as some community members resorted in consulting relatives for support (food and money). Table 5.3 indicates that livestock suffered due to lack of grazing land and some farmers had to sell the livestock (cattle, sheep and goats) at a low price that led to social distress, dying of crops, and resulted in a lack of food for families.

The impact on the area has left many people devastated because the water sources dried up and their social activities were dysfunctional. Daily activities such as domestic work, attending school and visits to the clinic, did not function as expected, which is the reason why 83% is the highest score in the table. Drought may cause the poor subsistence farmer to lose all his livestock and the farmer will remain with nothing that will sustain his family in the event of drought (Dercon, 2002). Mitigation measures need to be implemented in advance to assist vulnerable community members as is stipulated in the Disaster Management Act, Act 57 of 2002.

The disaster management structures and approaches were revisited in 1995 as indicated in the literature, where the cabinet endorsed that the formal structures for disaster management be recognised (Green Paper, 1997). The community of Goedgevonden village needed intervention in order to address some of the problems as suggested in the policy stated above.

As literature suggests, the subsistence farmers might not have had opportunities to produce for markets as their operations basically focused on food security provision and diversifying income for the household (Reynolds et al*.,* 2001). It can be agreed that the Goedgevonden village community had a majority of subsistence farmers who dealt with small-scale crop and livestock farming and their production was limited. Other farmers have small enclosures to keep their livestock of 5 to 15 animals. The animal dung can provide the households with fuel for firewood and fertiliser for crop production (Scoones et al*.,* 1996). The same applied in Goedgevonden, as some community members relied on dried animal dung for firewood, and as a result, the shortage of livestock affected them as there was not enough for firewood. The situation aggravated their status because some had to buy wood which impacted negatively on their expenditure.

Concerning warnings about drought, respondents whose had no education, reflected a total of 30% on drought warning knowledge (Figure 5.6). Only 16% of the respondents said ‘yes’ on having drought warning knowledge before it started, while 14% did not have any warning knowledge about drought. The respondents with primary education has total of 31%, and those that had drought warning knowledge before it started reflected 20%, and 11% that said ‘no’ to the question. Respondents with secondary education had total of 36%, where 23% of respondents have received warnings about drought, while 13% did not receive warnings about drought before it started.



Source: Survey results (2017)

Figure 5.6: Warnings about drought in correlation with educational level

Lastly, only 3% with college education had warnings knowledge about drought onset. It is clear that there was not much difference on the warnings about drought in relation to education. The Goedgevonden village had only a few people who were at institutions of higher learning as similar results were stated in Figure 5.4 under education and gender (a small number of respondents had qualifications from institutions of higher learning).

It can be understood that respondents with secondary education had received warnings and that could have made them more cautious in advance about the drought situation than other groups without an educational background. The majority of respondents in the Goedgevonden village had secondary education. As a result, the context of drought warning messages was understood; hence, some respondents managed to mitigate the situation. It can be agreed that if a person has gone through school he will be able to read and understand issues that affect him daily. In addition, people should be told about the status of community resources for mitigation of the hazards they face and the manner in which they should seek help to solve the situation (Levine, 1989:153). It is clear that the awareness operation should have targeted all community members, including those without education, and the design should have been in such a way that the concept of disaster management would be understood by all.

The respondents were allowed multiple responses, and the most significant strategy for publicising information is through television, radio, and newspaper as reflected in Table 5.4.

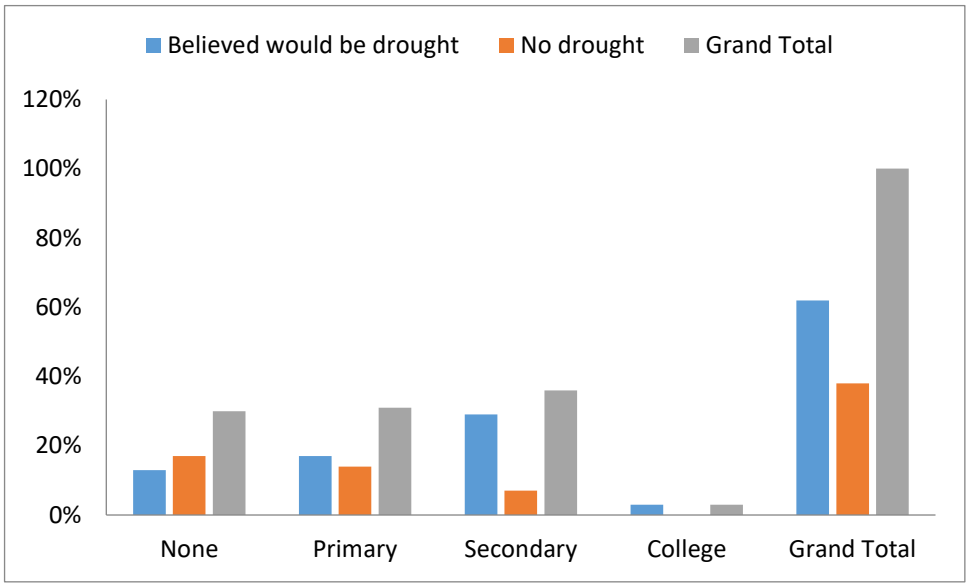
TABLE 5.4 HOW WARNINGS OF DROUGHT WERE DISSEMINATED

Response		Percentage
1.	Television	60
2.	Radio	44
3.	Word of mouth	25
4.	Newspapers	24
5.	Extension officer	0
6.	Other	17

Source: Survey results (2017)

Respondents were allowed multiple responses as shown in Table 5., and television and radio were given the highest priority, with 60% and 44%, respectively. Word of mouth reflected 25% and newspaper 24%. A total of 17% chose “other”, but none chose the extension officer option. It can be assumed that community members would be able to get warning information while considering that most household members had television and radios, and could access newspapers as was observed during the visit. Some can get warnings from word of mouth as they communicate amongst themselves.

There must be a taskforce that should keep the public well-informed of the status of water supplies, the situations that lead to request for water usage restrictions and measures that are appropriate to access drought assistance (NDMC, 2005). The media should be involved during the hazard plans and information should be disseminated in the order that they have the necessary background to be an effective and reliable source of information should the disaster occur (Poyarkov, 2005). The Ventersdorp Local Municipality wherein the Goedgevonden village is situated, was supposed to advocate a drought awareness campaign for the community members well in advance, especially those that were vulnerable so as to implement mitigation measures as suggested in the literature. If the risk is not known, then it is not possible to manage and reduce its efficiency, and awareness of risk should lead to action to be taken to deal with the risk (UNDP, 2012). The public requires constant educational engagement about changing climate, the results thereof and mitigation strategies, especially those related to farming and water use.



Source: Survey results (2017)

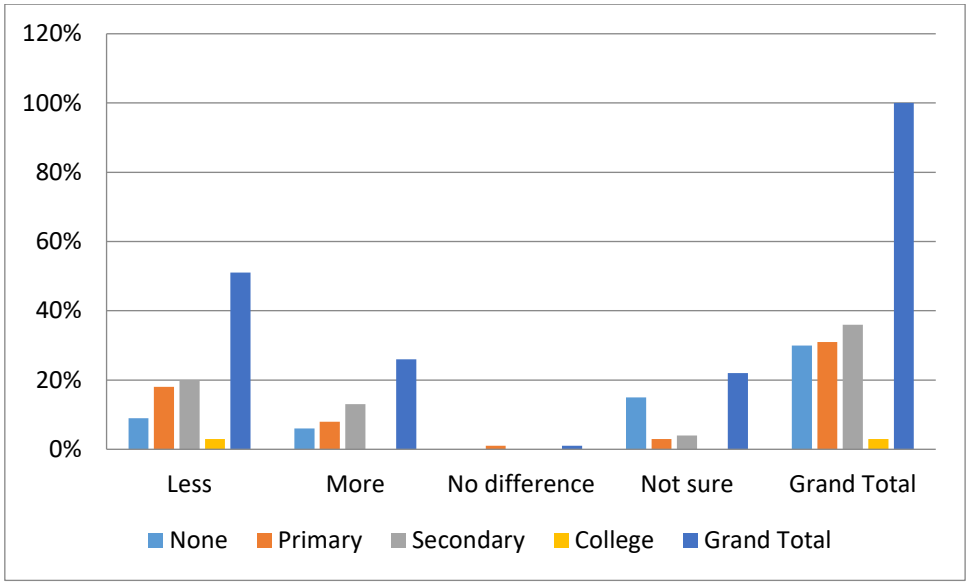
Figure 5.7: Respondents' beliefs on drought news in relation to their education

Of the 30% respondents with no educational background, 13% believed there would be drought, while 17% did not believe that there would be drought in the area. Respondents with primary education reflected a total of 31%, where 17% of these respondents believed that there would be drought, while 14% did not believe that there would be drought. A total of 36% of the respondents with secondary education responded and 29% believed that there would be drought, while 17% did not believe there would be drought. Lastly, all three 3% of the respondents with a college education background believed that there would be drought. Figure 5.7 also shows that those with an education background had a high percentage of respondents who believed that there would be drought.

The level of education of respondents in this graph clearly indicates that education determines the people's beliefs on drought news. If a person has education, he is able to make contingency plans if he is informed about drought possibilities in advance. The majority of respondents who had an education background believed that there would be drought; hence some were not seriously affected by the drought episode in the area as compared to respondents with little or no education.

It is also clear that level of education increases the capacity and capability of the community members to understand disaster risk management. In the Goedgevonden village where there are both a primary and secondary school, the level of education contributed in making the majority of the community members to believe the news on the drought. It can be agreed with the literature which suggested that education programmes should be designed to bring awareness of short- and long-term water supply issues in the area, so that people would

believe when told of a drought approach (NDMC, 2005). The lack of knowledge of what to do with warnings after receiving them, poses a challenge. The community of Goedgevonden village has people who went through secondary school level, therefore those who did not believe about the drought news should be taught to understand the importance of drought warnings. Vulnerability is increased by lack of knowledge from community members.



Source: Survey results (2017)

Figure 5.8: Drought frequencies in relation to respondents' education level

It is indicated in Figure 5.8 that the respondents who believed drought frequency were less, reflected total of 51%. Nine percent of the respondents had no education background, 18% had primary education, and 21% secondary education, while 3% had college education. The respondents, who said the frequency of drought was more, reflected a total of 26%. Six percent came from the respondents with no education background, 8% from those with primary education and 12% comes from respondents who had secondary education background.

One percent of the respondents with primary education background did not see the difference on the frequency of drought. This figure also shows that the majority (51%) of respondents saw the frequency of drought as being less, while 26% w the frequency being more and 1% did not see the difference and 22% of respondents were not sure. Those with primary and secondary education saw drought frequency to be less. Even if the majority saw the drought frequency as being low, the responses do not seem correct. In reality, if people can be educated on drought tolerant crops, this will reduce the proportion of late maturing to alleviate the impact of drought in the Goedgevonden village especially as the frequency of drought in the area might increase in the future. Those who were not sure of the drought frequency should

be educated about drought issues that affect their area to enable them to enhance their knowledge on climate issues affecting them directly or indirectly.

TABLE 5.5: NUMBER OF WATER SOURCES USED BEFORE DROUGHT

Water sources before drought	Number of respondents	Percentage
1−2	63	72
More than 2	24	28
Total	87	100

Source: Survey results (2017)

A total of 72% (63) of respondents had one or two water sources available before the drought and 28% (24) of respondents had more than two water sources. The water sources were enough for the community and livestock before the drought. It is important that during a drought period, water supply should be targeted as the most vulnerable resource because experience has shown that water availability is more critical. The fact that Goedgevonden village had more water sources before the drought, it can be agreed that there were not enough awareness campaigns of the drought coming, hereafter the community could not use water properly or did not develop resilience.

It can be concurred with Shah (2001) who believed that there should be considerable opportunities to provide water in the drought through small and minor irrigation schemes and land-use approaches that would enhance soil moisture and water retention. If people are trained with these skills, they will be in the position to be less vulnerable to the impact of drought.

TABLE 5.6: TYPES OF WATER SOURCE/S BEFORE DROUGHT

Response	Percentage
1. Stream	5
2. Borehole	85
3. Reservoir	64
4. Dam	29
5. Other	2

Source: Survey results (2017)

The above table indicates the responses based on types of water source(s) before the drought episode. The majority of responses reflected 85% of the respondents who depended on boreholes as source of water. Sixty-four percent relied on reservoirs, 29% on the dam, while 5% and 2% relied on streams and other sources. Before the drought the community had various sources of water that was sustaining them though others complained that the boreholes were not maintained.

The use of boreholes by the households ensured the safety of the water. Nevertheless, the safety of the water from the dam, and rivers was not guaranteed in the Goedgevonden village as it is reflected in Table 5.6. Among the basic elements of drought, Van Zyl (2006) highlighted that the water supply should be maintained in the development of the rural areas in order to reduce the highly vulnerable water sources such as seasonal rainfall, springs and river flow. It can be concurred with the literature because the water sources were not maintained before the drought, hence the level of water dropped while the community was aware of the situation but nothing was done. No-one warned the community members on the water usage during the drought period because it appeared that the community was not aware of the situation.

Table 5.7 refers to the types of water sources in the area and the respondents were given multiple choices.

TABLE 5.7: TYPES OF WATER SOURCE(S) AFTER THE DROUGHT

Response	Percentage
1. Stream	1
2. Borehole	54
3. Reservoir	64
4. Dam	10
5. Other	18

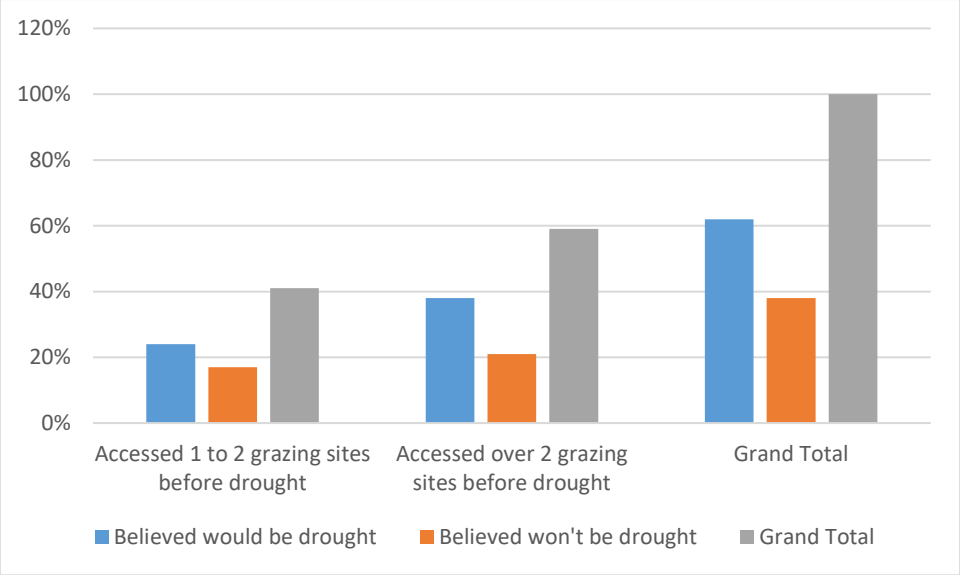
Source: Survey results (2017)

A total of 64% is reflected on the respondents who utilised the reservoir after the drought. The respondents who made choices on boreholes reflected 54% where it was discovered that some of the boreholes ran out of water because of overuse as seen in Figure 5. The small dam in Goedgevonden ran dry and this was reflected by 10% of the respondents. The respondents stated that the municipality intervened by bringing in trucks that supplied the community with water.

Source: Author's own (2016)

Figure 5.9: Dry tap-water systems in Goedgevonden

One percent is the reflection from the respondents who used stream water after the drought. Eighteen percent is the reflection of 'other' which may be those who relied on rainwater or those who fetched water from the town or neighbouring villages using own transport. The water system was not maintained as Figure 5.9 shows and this testified to the statement made by Van Zyl (2006) who suggested that development of a backlog of water delivery systems in most rural areas must be addressed with urgency, especially in the rural areas in order to mitigate drought risk. Community members became vulnerable because of the water system that was not working, the river system and dam that was left to dry up and the incapacity of municipality to maintain the boreholes.

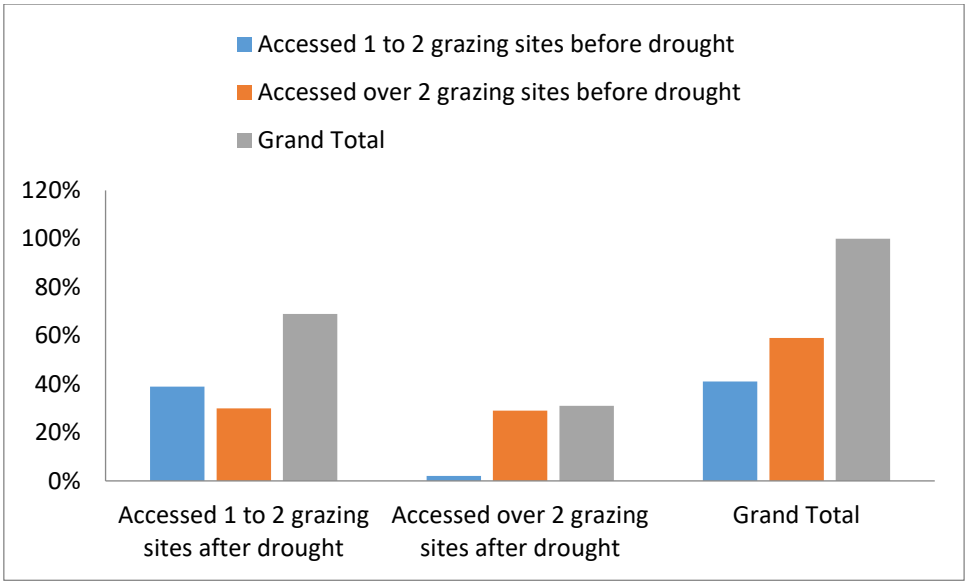


Source: Survey results (2017)

Figure 5.10: Access to grazing sites before drought in relation to beliefs on drought occurrence

The respondents who accessed one to two grazing sites before the drought reflected 41% and the respondents who accessed more than two grazing sites before the drought reflected 59% of the respondents. Respondents who believed that there would be drought were the ones that accessed most of the ground than those who did not believe as they reflected 38% and 21%, respectively. Seventeen percent and 21% is reflected by respondents who accessed one to two grazing sites before the drought out of the total of 41% as shown in Figure 5.10.

The literature stated that there would be a drought disaster at the start of any El Niño period, which means that Southern Africa regions would have a frequency of drought events (Thompson et al., 2003). It can be concluded that respondents who believed there would be drought accessed more grazing land than those who did not believe, hence people should learn to be conscious on what they are warned about in order to be resilient to situations. It shows that those who believed had made contingency plans in advance; hence they were not seriously affected like those who did not believe. Ignorance of hazard warning issues put on the public domain placed the community in vulnerable situations that aggravate their socio-economic drought impact.

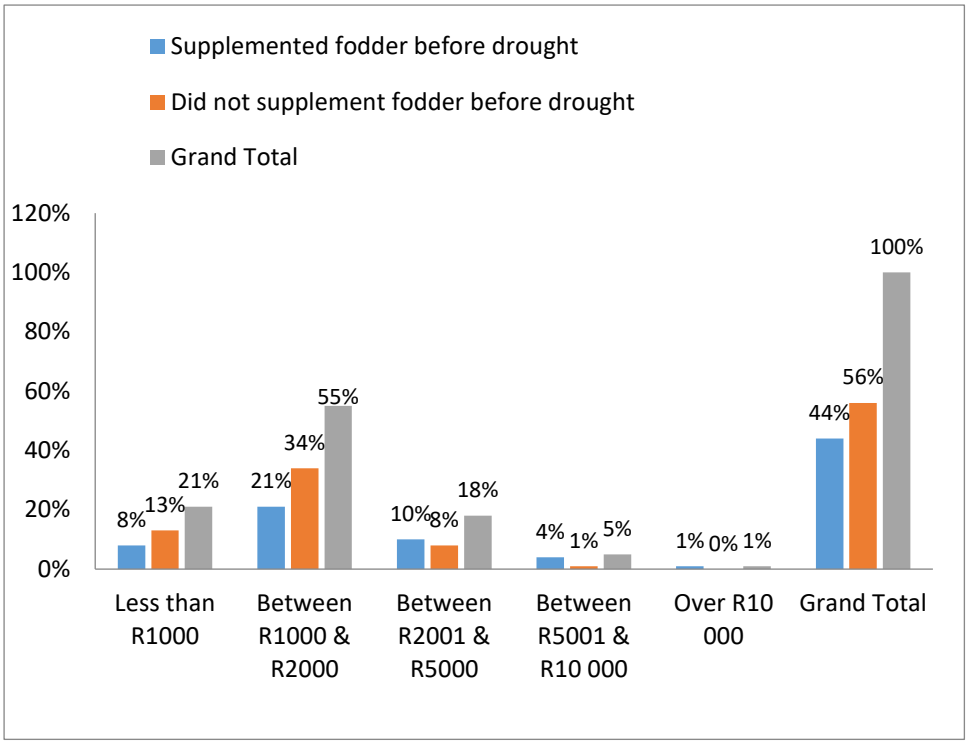


Source: Survey results (2017)

Figure 5.11: Respondents who accessed grazing sites before the drought in relation to after the drought

A total of 69% of the respondents accessed one to two grazing sites after the drought, where 39% of the respondents accessed one to two grazing sites before the drought and 30% accessed more than two grazing sites before the drought. On the other hand, a total of 31% of the respondents accessed more than two grazing sites before the drought, 2% of the respondents accessed one to two grazing sites before the drought and 29% accessed more than two grazing sites before the drought. It can be concluded that, based on the results reflected on Figure 5.11, the majority of the respondents depended on communal grazing. If a disaster hit, community members would suffer collectively. Risk management needs both the technical expertise in the hazard process, including the complex social and economic conditions in order to drive risk in vulnerable communities such as the Goedgevonden village.

The community became vulnerable as they were unable to feed their livestock, where some members had to sell their livestock at low prices. The information that was obtained from some of the farmers who sold their cattle indicated that they saved their money for buying livestock in the future when conditions would be favourable. It can be can suggested that there was a need for community members to be skilled to establish a fodder bank on their own as means to mitigate their drought challenges and that this would build resilience in the community. Participation enriches feeling of control and it enhances resilience and competencies in the community, resulting in support on numerous developmental processes (Dworken et al*.,* 2003). Cheaper and manageable locally adaptable solutions can be achieved through involvement into the insight of their own challenges.



Source: Survey results (2017)

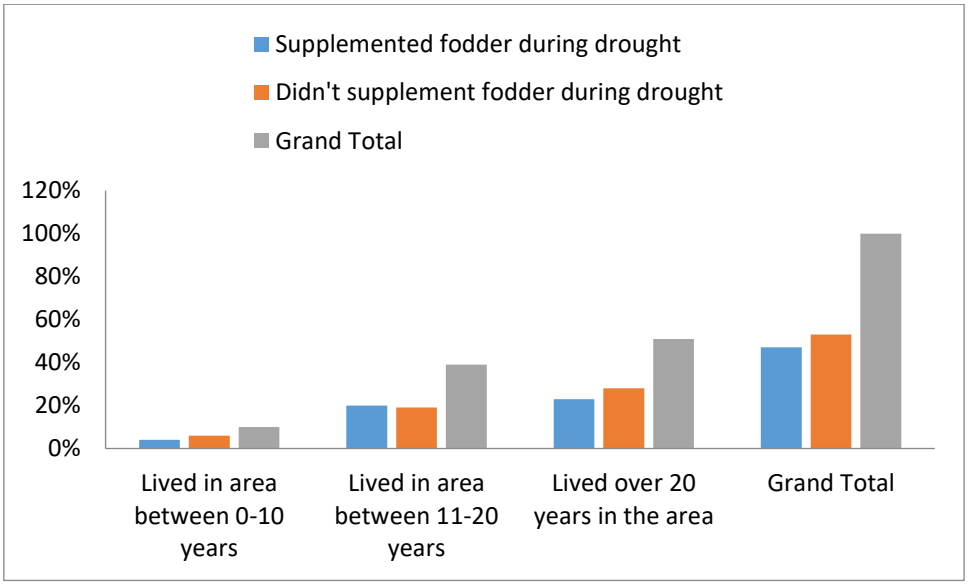
Figure 5.12: Cattle fodder supplement before drought in relation to farmers' monthly income

The farmers with less than R1 000 incomes reflected a total of 21%, where 8% supplemented fodder before drought and 13% did not. In the category R1000 to R2 000, respondents reflected a total of 55%, where 21% and 34% are those who supplemented fodder before the drought and those who did not supplement, respectively. The respondents in the category R2 001 to R5 000 reflected a total of 18%, where 10% and 8% were those who supplemented fodder before drought and those who did not. A total of 5% was reflected by the respondents in the category R5 001 to R10 000; with 4% and 1% who supplemented fodder and those who did not, respectively. This category reflected a low percentage of respondents, which is an indication that few members earned that much.

It can be concluded that the majority of respondents in the Goedgevonden village fell in the category R1 000 to R2 000 monthly income, which is an indication that Goedgevonden community members were low-income earners and as a result, the exposure to drought impact aggravates their socio-economic status. The same was advocated by Vogel (1998), who suggested that risk relies on a mixture of the regularity that is the rigorousness of the hazard and the vulnerability of the people. The researcher agrees with the sentiment, as the more exposed the community is to a hazard, the more they spend in trying to make a living and it becomes worse if the community income bracket is very low like in Goedgevonden.

In the last category of respondents who earned over R10 000, only 1% of the respondents supplemented fodder before drought. The reflection in the graph indicates that the respondents who had a better income managed to supplement fodder, unlike those with a lower income. The respondents in income category of R2 001 to R10 000 managed to supplement fodder, though they were not in the majority.

It can be concluded that the majority of the farmers in the area did not supplement fodder before the drought. Vogel et al. (2000:32) stated that drought can change the normal activities of a community that relies on the natural environment to produce food, grazing and earn an income. Drought brought vulnerability, hence there is a need for the community to have contingency plans once they hear about warnings of drought in the future. The community and farmers were caught unprepared for the drought episode and the consequences were unbearable for both. The fodder shrub technology was introduced in Kenya as feed and was a success because it used a low-cost technology that was easy to use and effective in raising milk earnings and was a substitute for expensive dairy feed concentrates (Place et al., 2009). This idea can be implemented in Goedgevonden in order to ease the burden on the municipality. Community members will be able to feed their livestock and be able to get milk to support their households.



Source: Survey results (2017)

Figure 5.13: Farmers who supplemented fodder during drought in relation to years they lived in the area

A total of 10% was reflected by the respondents who have lived in the area between 0 and 10 years and the results showed 4% and 6% for the respondents who supplemented fodder during drought and those who did not, respectively.

Of the total of 39% respondents who have lived in the area between 11 and 20 years, 20% supplemented fodder during drought and 19% did not. There is not much difference between the respondents who supplemented fodder and those who did not. The reason might be that the two groups have lived in the area for long and some may have had knowledge on when it was necessary to supplement or not.

The respondents who lived in the area for more than 20 years had a total of 51%, where 23% supplemented fodder and 28% did not. The results showed that the respondents who lived in the area for a longer time were able to mitigate and sustain the drought episode, as they possessed indigenous knowledge to deal with the drought situation, as one farmer indicated in the interview. They knew when it was necessary to supplement fodder and when not, and they were able to mitigate drought on their own. They were people who lived in the area for a long time and realised that the amount of rainfall had decreased resulting in drought. These people might have been observing rainfall trends in the past years as opposed to the people who had been in the area for only a few years. The community participation was essential at some stage where some Goedgevonden community members managed to address their challenges together as one respondent commented.

TABLE 5.8: FARMERS SHARING GRAZING LANDS BEFORE THE DROUGHT

Respondents	Percentages
Shared grazing land before the drought	44
Did not share grazing land before the drought	56
Grand total	100

Source: Survey results (2017)

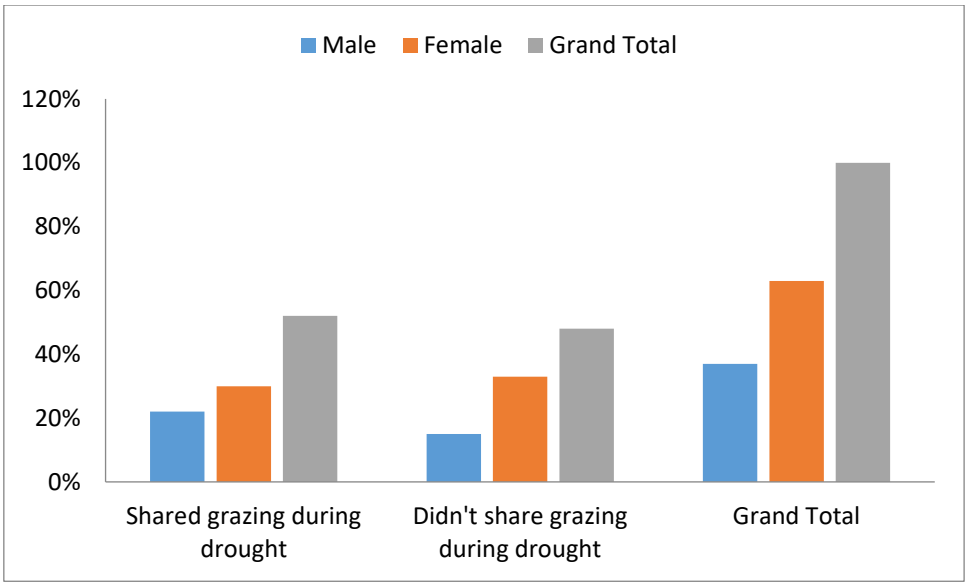
A total of 44% respondents shared grazing land before the drought, while 56% of the respondents did not share grazing land before the drought. The majority of the respondents shared grazing lands after the drought episode.

Box 1: Farmers sharing grazing lands before drought

Additional information on sharing of grazing lands before drought:

- The respondents shared the land as they indicated that it was communal land ownership.
- Others had to send their livestock to the surrounding neighbours in search of grazing lands.
- They had to travel long distances to where the livestock was grazing.
- The grazing land was not enough for livestock.
- Some lost cattle because they travelled long distances in search of grazing fields.
- Some cattle were still suffering as they fed on unwanted grass (*Mogau)* in the process and one farmer lost five cattle because of that.

It can be stated that community members resorted in sharing of land as a way of trying to make a living. They were vulnerable to drought and sharing of land as a resource was an act of trying to survive the situation. It should be noted that the land was owned communally. Van Zyl (2006:57) required that disaster risk assessment be undertaken, and anticipation and plan for known hazards to be put in place. Application of these efforts would mitigate the problems in the area as needs for grazing land and needs for supply of fodder should have been anticipated in advance.



Source: Survey results (2017)

Figure 5.14: Farmers who shared grazing land during drought in relation to gender

A total of 52% respondents shared grazing land during the drought, of whom 22% were male and 30% were female. On the other hand, 48% respondents did not share grazing land, of whom 15% were male and 33% female. Most of the respondents, as they were verbally interviewed, stated that they were sharing the grazing fields as land was collectively used for crops and grazing. The majority of the respondents were female as they were in the majority in the area as reported previously.

Figure 5.14 further indicates that the number of farmers who shared the grazing fields increased, as they had to ensure that their livestock access grazing land. This is in agreement with Ashley and Carney (1999) who believed that rural development requires that the poverty removal programmes should be addressed with various structures to increase the community resilience. Goedgevonden should have received support from the municipality by provision of enough fodder and water that would have mitigated the situation.

Box 2: Farmers who shared grazing during drought in relation to gender

Additional information on sharing grazing lands during drought:

- Village did not have grass for livestock to feed.
- The livestock started to die because they fed on certain grass that was dangerous. That grass takes years in the cattle's stomach and the after-effects would start to kill them after a year or two.
- The cattle had poor health.
- They had to sell livestock because it was difficult to keep them.
- Support was not available from the municipality.

TABLE 5.9: FARMERS VIEWS ON RELOCATION ACCORDING TO GENDER

Gender	Felt like relocating due to drought (Percentage)	Did not feel like relocating due to drought (Percentage)	Total
Male	7	30	37
Female	11	52	63
Total	18	82	100

Source: Survey results (2017)

Respondents who felt like relocating due to drought have a total of 18%. Males made up 7% and females 11%. The respondents, who did not feel like relocating, were a total of 82%, of whom 30% were male and 52% female. It showed that the majority of the respondents did not feel like moving away from the area because of the drought as they felt they could not leave their place of birth. Others indicated that they could not move to a place they did not know, as they believed they would be resilient to the drought conditions in the Goedgevonden village.

Box 3: Farmers' views on relocation according to gender

Additional information on migration due to drought:

- Someone left because he felt the village was not good during drought to make living – loss of livelihood.
- One respondent said her neighbour had a two-week old baby and it was a challenge to wash clothes and bedding for the child if she had to leave the village – water scarcity.
- The brother to one respondent had to migrate in search of work as there was no work prospects around because the crops were no longer providing a living – livelihood.

It can be concluded that the majority of the community members did not leave Goedgevonden during the drought as some felt they would be resilient to the situation. Although 18% of the respondents reflect a small number of respondents who felt like relocating, this could be a challenge for South Africa's urban areas because of rural−urban migration. Rural−urban migration results in depopulation of rural areas, leading to abandonment of rural services such

as farming, schools and closing of shops (Dilley et al., 2014). Rural−urban migration leads to a rise in unemployment figures within the village as there were only a few investments and the rural area was left with women, old people and children. On the other hand, urban areas become overpopulated leading to various problems.

TABLE 5.10: ACCESS TO CLEAN DRINKING WATER

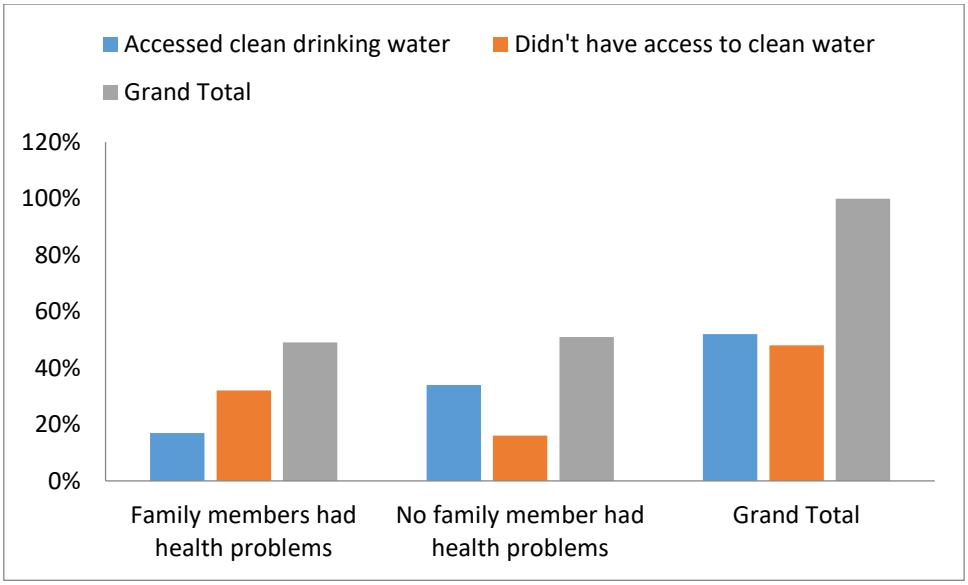
Drinking water	Percentage
Had accessed clean drinking water	52
Did not have access to clean drinking water	48
Total	100

Source: Survey results (2017)

It was indicated that 52% of the respondents had access to clean drinking water, while 48% did not have clean drinking water. The difference was not much between the two categories. It shows that the majority in the area had supply of drinking. It can be concluded that there was a need to use clean drinking water sparingly and all areas of Goedgevonden village should be provided with clean water during drought episodes. Infrastructure should prioritise the need for water in the area before drought episodes occur.

It can be agreed with the Constitution of the Republic of South Africa (1996), section 41(1) (b), where Chapter 2 (Bill of Rights) stipulates that every citizen has the right to life, environment, healthcare, food, water and security. These rights co-occur with the main objectives of disaster management, as an obligation of the government of South Africa. The community of Goedgevonden was supposed to have been serviced as the Constitution dictates.

Figure 5.15 shows that a total of 49% was reflected by family members who had health problems, of whom 17% had access to clean drinking water while 32% did not have access to clean water. Respondents who did not have access to clean drinking water had many family members who experienced health problems.

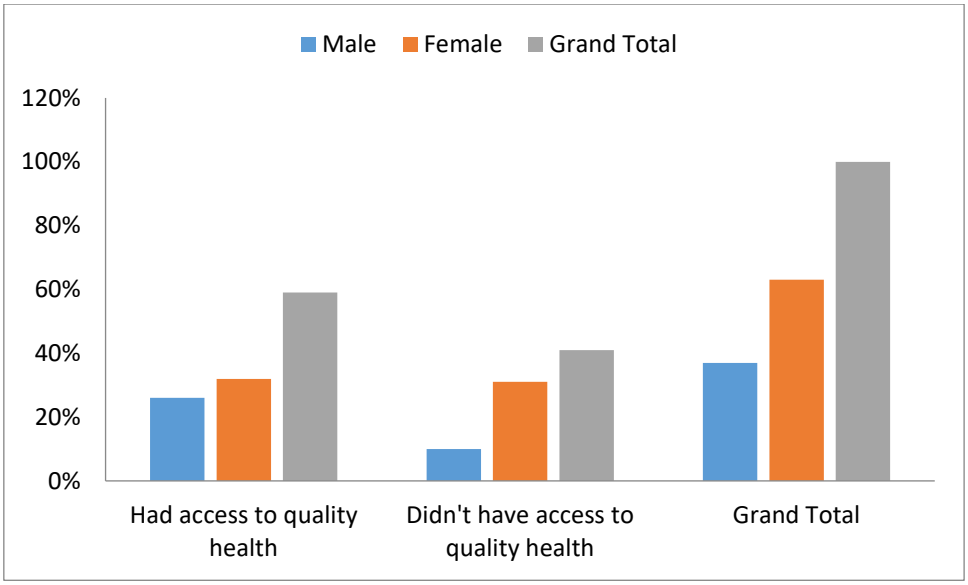


Source: Survey results (2017)

Figure 5.15: Health problems in relation to access to clean drinking water

On the other hand, a total of 51% is reflected by respondents whose family members did not have health problems and 34% of the respondents accessed clean drinking water, while 17% of the respondents did not have access to clean to clean water and had family members who did not have health problems.

The Municipal System Act, Act 32 of 2000, stipulates that an assessment of the existing level of development in the municipality must include the identification of communities who do not have access to basic services such healthcare during drought. The majority of those who had access to clean drinking water had no health problems as compared to those who did not. It is important that during a drought episode the community members should be provided with clean drinking water and should be taught to boil water that is not clean. There is a need for water purification measures that must be taught and implemented in the community during hazards to eliminate water-related sicknesses.



Source: Survey results (2017)

Figure 5.16: Quality health access in relation to gender

A total of 59% of respondents had access to quality health, of whom 26% were male and 32% female. On the other hand, a total of 41% of the respondents did not have access to healthcare, of whom 10% were male and 31% female. The responses showed that the majority of community members had access to health care and they stated that the Goedgevonden clinic was able to provide the services needed. Box 4 shows the comments by the respondents.

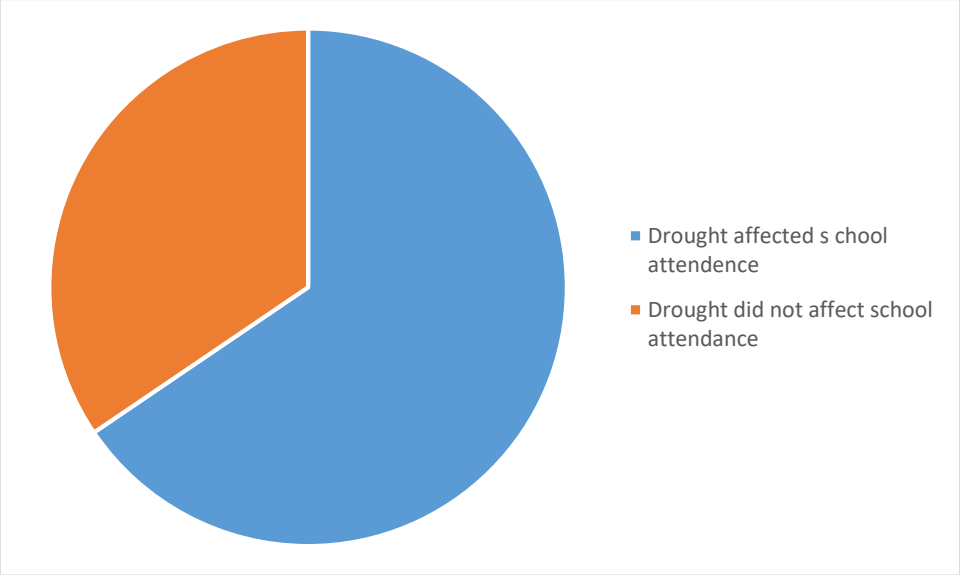
Box 4: Quality health access in relation to gender

Additional information from respondents:

- Majority who said they had access to quality health indicated that the clinic was available and providing medication during drought.
- The 41% of those who said they did not have access to quality health stated that the clinic was inefficient as there was shortage of medication and sometimes they were provided with painkillers only because of shortage of other medications.

Even though the majority felt that the clinic was assisting them, those who did not agree had indicated that there was a need to upgrade the clinic so that they would have enough medication and nurses to meet the demands of the growing population in the Goedgevonden village. Some respondents cited the need to increase the working hours because they felt that the operational hours of the clinic were insufficient as they struggled in the evenings during emergencies. It can be concluded that the area should have been provided with healthcare services that operated throughout the night during the drought episode to mitigate the

conditions stipulated in the Municipal Systems Act. However, as the government is bound to supply free medication, efficiency is possible but the population increase in the area outsmarted the resources available. It is important that contingency plans are made in order to deal with circumstances such as these.



Source: Survey results (2017)

Figure 5.17: Effects of drought on school attendance.

The majority (66%) of the respondents agreed that drought affected school attendance, while 34% said it did not affect the school attendance. This shows that the majority of learners where negatively affected by the drought where school attendance was poor during that period. The situation was affecting school learners as some depended on a feeding scheme to get food through the National School Nutrition Programme if there was no school on a specific day, which meant they would have nothing to eat as there was shortage of food at home as well. Comments from respondents are stated in Box 5.

Box 5: Effects of drought on school attendance

Additional information on effect of drought on school attendance:

- Respondents indicated that the school children could not attend because they cited that the truck that brought water sometimes did not bring water on time.
- Some indicated that the truck sometimes ran out of water before reaching their section.
- The children could not go to school because the feeding scheme at school was sometimes not operating and they were advised to remain at home.
- School toilets had no water and they were sometimes forced to go back home because the teachers felt it was unhygienic at school.
- Some had to carry a bottle with drinking water to school.
- Some arrived late at school while others sometimes had to leave school early.

It can be concluded that the municipality and education officials did little to ensure that schooling was not disturbed. Those learners in Goedgevonden who happened to miss school meals were vulnerable to malnutrition, as Vogel et al. (2000:3510) suggested that the compound issues that brought food insecurity are worsened by the drought event that increased people's vulnerability.

TABLE 5.11: INCOME IN RELATION TO FARMER ASSISTANCE

Income per month	Enough assistance (Percentage)	Not enough assistance (Percentage)	Total (Percentage)
Under R1 000	5	16	21
Between R1 000 and R2 000	23	32	55
Between R2 001 and R5 000	9	9	18
Between R5 001 and R10 000	2	3	5
Over R10 000	1	0	1
Total	**40**	**60**	**100**

Source: Survey results (2017)

Concerning income in relation to farmer's assistance, 21% was reflected by respondents who fell in the income bracket of less than R1 000, with 5% are those who believed assistance was enough while 16% believed it was not. Farmers that had less income were more vulnerable to drought and thus more food insecure.

A total of 55% of the respondents fell in the R1 000 to R2000 income category, of whom 23% believed assistance was enough and 32 believed it was not. This category had the majority of the respondents who believed the assistance was not enough.

The respondents who fell in the income category of R2 001 to R5 000 had a total of 18%, with a balance of 9% for those who believed there was assistance and the other 9% those who did not believe.

A total of 5% was shown by respondents who fell in the R5 001 to R10 000 category, with 2% who believed assistance was enough and 3% who believed it was not enough.

Only 1% of the respondents in the income category of more than R10 000 believed that there was enough assistance from the municipality. Farmers with more income are likely to adopt more than one drought coping strategy than only drought resistant crops or animal breeds. For example, cash can be utilised to purchase additional feed for livestock to persist until the drought period has passed. From Table 5.11 it is evident that the majority of respondents from different income categories did not believe that the assistance from the municipality was

enough during the drought episode. The comments made by the respondents are stated in Box 6.

Box 6: Income in relation to farmer assistance

Additional information regarding assistance from the municipality:

- Respondents felt there was incapacity from the municipality as water quality was poor.
- They said the water delivery truck came for a few days and on other days it did not come and they had to suffer.
- Others had to pay someone to fetch water for them.
- Truck sometimes ran out of water before servicing them.

It can be concluded by looking at the SLF, which emphasised that in people's pursuit of livelihoods, there is a need for transport infrastructure, fertilisers, more crop yields, water and support from stakeholders, in order to minimise the impact of the disaster (UK DFID, 1999).

5.2.3 Economic impact of drought

Sustainability of farms and services related to agriculture are sensitive to a mixture of climatic and non-climatic risk (Abbasi, 2014). The communities face challenges of both climatic and economic factors. A production unit that are already suffering from severe economic anxiety would be less resilient to drought than a production unit with better economic resources (Abbasi, 2014). A stronger resilience is due to higher equity, access to credit or advanced paying from the off-farm livelihoods' income generation. The recent changing weather patterns in South Africa could also have an undesirable impact on the crop production economy. The livestock, crops, wages and social grants form the basis for the analysis in this section for the Goedgevonden village. Multiple responses were sought from the respondents on some of the choices of economic livelihoods as indicated in Table 5.12.

TABLE 5.12: HOUSEHOLD SOURCES OF INCOME DURING DROUGHT

	Type of economic livelihood	Percentage
1.	Livestock farming (subsistence)	32
2.	Agricultural farming (subsistence)	11
3.	Petty trading	11
4.	Wage labour	33
5.	Skilled labour	7
6.	Other (depended on social grants)	64

Source: Survey results (2017)

Table 5.12 reflects the multiple responses from the community regarding the sources of income. The majority (64%) stated that they depended on social grants to sustain them, while 33% were the wage earners and 32% livestock earners. Agricultural and petty trading each made up 11% as source of income. In the minority were the skilled labourers who made up 7% of respondents. It shows that drought had brought serious challenges on the livelihoods of the community as some lost their source of income (livestock, crops, trading). Some had to try multiple sources in order to make a living. Farmers who produced insufficient food to achieve self-sufficiency had to resort to other sources of entitlement to feed their households.

According to Townsend (1994), the amount of support depends on the social connection a household has built in the community. Small-scale farmers who are more vulnerable to risk are found to receive insufficient support because they are less connected. As suggested by Fafchamps and Lund (2003), practical evidence has indicated that exchange of presents and informal credit are significant efforts of risk-sharing and rural households frequently apply the ways to smooth their consumption desires and income means. Genicot and Ray (2003) emphasised that risk-sharing is found among members of extended families, neighbouring members, religious groups or ethnic groups during times of destitution such as drought. The community of Goedgevonden had some of the members who relied on risk-sharing exercises to mitigate the drought situations as one respondent commented.

At the time of data collection, the respondents were asked about their sources of income which is presented in Table 5.13.

TABLE 5.13: CURRENT SOURCE OF INCOME FOR HOUSEHOLD

	Type of economic livelihood	Percentages
1	Livestock farming (subsistence)	31
2.	Agricultural farming (subsistence)	14
3.	Petty trading	13
4.	Wage labour	25
5.	Skilled labour	7
6.	Other (social grants and risk-sharing)	56

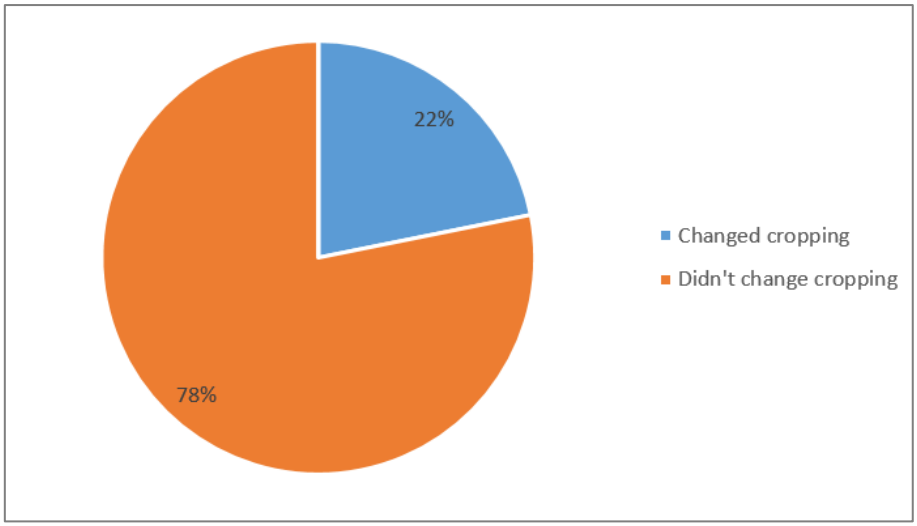
Source: Survey results (2017)

The survey on current source of income for household where respondents had multiple choices, showed that the majority (56%) of the respondents relied on social grants and risk-sharing for a living. Livestock farming followed with 31% and wage labourers with 25%. Petty trading reflected 13%, while agricultural farming reflected 14%. The increase in petty trading was as result of the injection of income from cash aid (grants) which implied that most households could afford and have money to buy goods sold from petty trading.

It can be suggested that households that had access to more land for crops would have advanced income levels. Nonetheless, this could be disturbed by rainfall patterns and soil fertility as result of drought. Household labour can be a significant source of income or means to access resources. As a result, the number of working members, their health, skills and education are significant in determining livelihood activities and outcome.

The source of income has dropped as shown in Table 5.13, as compared with Table 5.10, but agricultural farming and petty trading has risen slightly as compared with the results in Table 5.10, because of income from grants as people were able to use that money to buy goods. The grazing land had deteriorated which resulted in a drop in livestock farming, while agricultural farming was better than livestock although the quality of land has not been improved. It can be concluded that the source of income for the village has declined because of drought, and some respondents stated that they were not able to mitigate their circumstances.

At some stage, the focus on resilience referred to putting more emphasis on what the community could do for themselves through reinforcing their capabilities, rather than focussing on their vulnerability to disaster or needs in an emergency. Some of the community members disclosed that the activities on the ground were not focussing on establishing resilience at all, that emphasis was strongly on what communities could do for themselves. Some had a feeling that *'to reduce impact and mitigate drought cash for work programmes may be more efficient than food-based interventions (general food distribution)'*. Programmes such as these could generate employment for the community and bringing developments and construction of boreholes, irrigation schemes and water reservoirs. The UNDP (1990) indicated that programmes such as reconstruction programmes, are repeatedly planned and carried out in a hurry, hence community's root challenges on income generations are not entirely addressed.



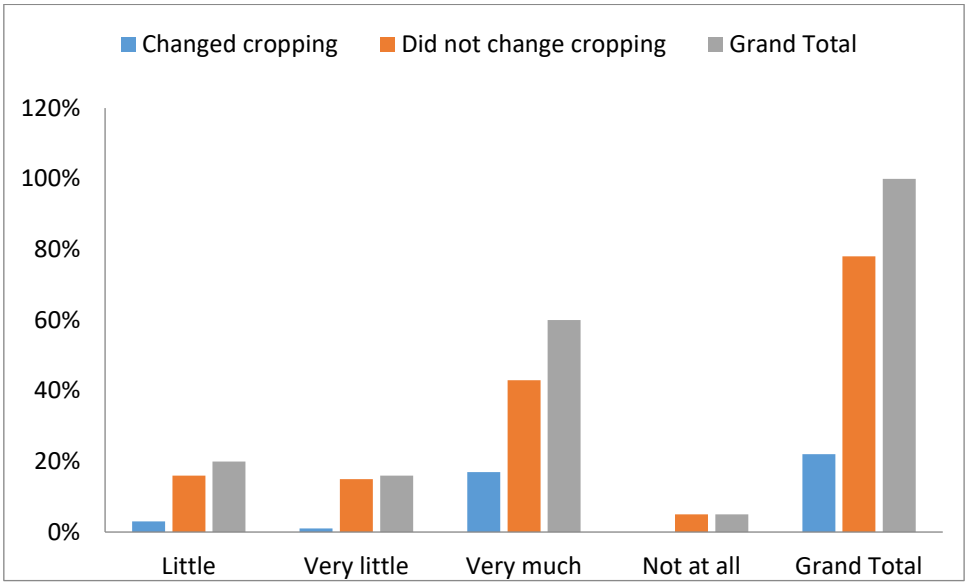
Source: Survey results (2017)

Figure 5.18: Change of crop system to cope with drought

Figure 5.18 shows that 78% of the respondents did not change their cropping system during the drought episode, while 22% did change their system. This is a reflection that the majority of the respondents did not change their cropping system because they relied on communal land ownership and it was not easy to change the system. Others could not change the crop system as they cited that they did not own land. Most respondents could not change their crop system as they practised subsistence farming where their operations were on small gardens. Failing to change the crop system made them vulnerable. As Muchinda (1999) suggested, farmers and communities should resort to diversifying of their production in order to cover alternative food and cash crops and to help farmers to cope better as they have additional crops or livestock to support their main farming enterprises. The results concurred with the statement, as these efforts are a means to mitigate the drought situation where some needs to resort to crop variety (drought resistant crops) in Goedgevonden.

The timing of rainfall is significant to get good crops. Although various crops require different amounts of moisture to grow, germination of many crops needs more moisture. Rainfall is needed in the early growing season for germination and initial growth during the late growing season (Abbasi, 2014). The projected climate change is the reason for crop decline in the production of crops under drying conditions in some regions even under full irrigation (CIMMYT, 2003). The statement approves how dependent maize crop production is on climate factors, particularly rainfall. It also emphasises how delicate agriculture as a whole is to climate variability. The statement supports the notion for crop changes during drought periods to mitigate the socio-economic drought impact.

The Agricultural Research Council predicted that some of the marginal western areas might become unsuitable for maize production under present management strategies, while the eastern production areas might remain unchanged or even increase production level in South Africa (Du Toit et al., 2001). It was however, concluded that some of the negative crop growth effects might be mitigated through the fertilisation effect of carbon dioxide gas on plant physiology. Another strategy includes moisture retaining farming methods, increased extension education to prevent unnecessary water losses from fields and changing land use or activities. The crops must be relatively drought resistant, they must not be able to survive long periods of drought but must also be able to produce large quantities of fodder during preceding times of plenty or periods of favourable rainfall, that can be used during times of drought (Thompson et al., 2003). Thompson et al. (2003) further suggested that drought resistant fodder crops must have a high carrying capacity and must be able to supply fodder to animals during drought. It therefore requires adoption of drought resistant crop varieties that will curtail the effects of this climate change on their production.



Source: Survey results (2017)

Figure 5.19: Effects of water shortage in relation to change of cropping

Looking at the effects of water shortage in relation to change of the cropping system (Table 5.19), a total of 20% respondents said that the effects were little, with 3% were those who changed cropping because of water shortage and 16% did not change the cropping system.

A total of 16% was reflected by respondents who said the change was very little, of which 1% is from the respondents who changed the cropping system and 15% are respondents who did not change cropping system. In a total of 60%, the respondents believed that water shortage was affected very much, where 17% of the respondents have changed their cropping system

and 43% did not change their system. Also, in a total of 5%, the respondents did not change their cropping system at all.

The entire graph shows that the majority of respondents did not change their cropping system even when there was water shortage in the area. It can be believed that the community did not own the land individually as the land was communal land which made it difficult for members to change the cropping system, resulting in their vulnerability. Most of the respondents were operating at small-scale and they did not have enough skills to develop their farming operation. Lack of water and farming skills aggravated some farmer's vulnerability situation.

There was a need for the Goedgevonden community to increase the use of drought resistant tolerant variety crops to give harvestable yields during drought periods. There was a need to train subsistence farmers to apply conservation farming in order to alleviate the effects of drought in future, and to remove the dependency mentality on government.

The impact of drought in a society is usually measured by government structures and international humanitarian aid to divulge trends and processes that can lead to vulnerability (Wilhite, 2000:64). The vulnerable households and communities are those that cannot rebuild their assets and livelihoods during and after drought hazard (Dercon, 2002:25).

TABLE 5.14: CROPPING SYSTEMS APPLIED

Type of cropping system	Percentage
1. Shifting to quick maturing crops	15
2. Intercropping	1
3. Cultivating of a vast area in different directions	6
4. Wide spacing	2
5. Other	0

Source: Survey results (2017)

The number of respondents in this section is low where 15% of the respondents shifted to quick a maturing crops system and 1% to intercropping, 6% on cultivation of a vast area in a different direction and 2% on wide spacing. The results showed that it was only a small number of community members who resorted in changing the cropping systems in the Goedgevonden village. It can be concluded that there was a small percentage of respondents in this table, which indicates that cropping was not practised intensively in this area and most of the land was communal as individual decision-making was not possible and these led to vulnerability on subsistence farmers.

As suggested by Pandey and Bhandari (2007), crop technologies that promote diversification as means of alleviating drought impact can be applied. The technology can facilitate planting of a second crop using residual moisture in rain-fed areas to increase income as well. This method can be utilised in the Goedgevonden community as many respondents are still having challenges on the cropping system as reflected in the table. Also, community members can collaborate in decision-making so as to improve food availability by implementing appropriate technologies to increase production and alleviate poverty in the area. The declining land quality of Goedgevonden village is reflected in Figure 5.20 as a result of the drought. Community members could not produce more because land has degraded as result of the drought and some of the community subsistence farmers could not make a living out of the land.

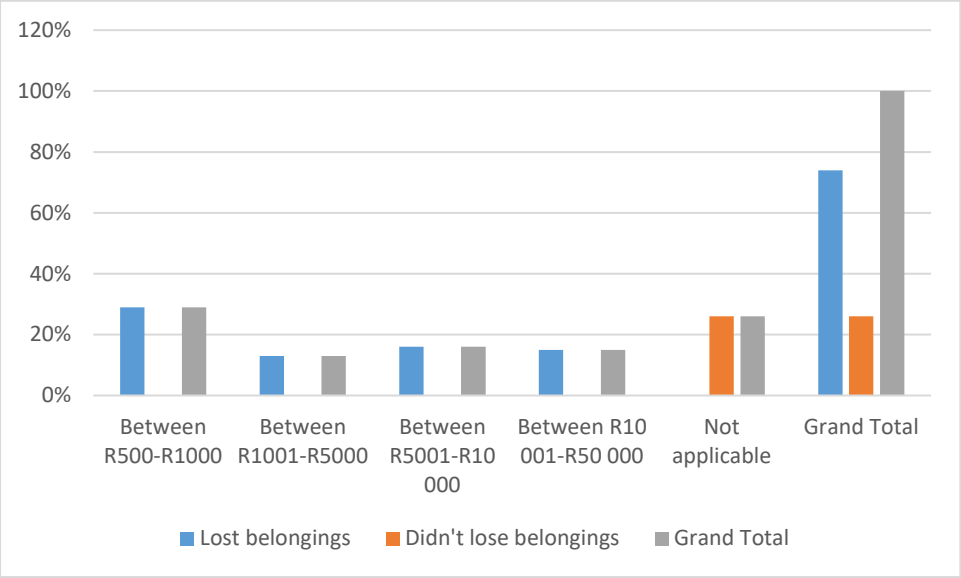
Source: Author's own (2016)

Figure 5.20: Crop fields that suffered due to the drought in Goedgevonden

Breeding programmes can yield an array of choices of plant materials that could associate with hydrological features and produce various responses to drought as was proposed in the literature (Pandey and Bhandari, 2007). If proper training can be instituted in the Goedgevonden village, techniques such as these can mitigate the situation in the future and the community will be resilient to the impact of drought. Shortage of water resulted in poor farming output, making people vulnerable to the impact of drought.

According to Wilhite and Glantz (1985), hydrological drought occurs after a shortfall in the rainfall that has remained for some time and which has had a bad impact on water supply

systems such as reservoirs, dams and rivers. This type can lead to societal impacts such as shortage of water and access to sources, which might sometimes lead to conflicts among communities.



Source: Survey results (2017)

Figure 5.21: Lost belongings due to drought in relation to cost value

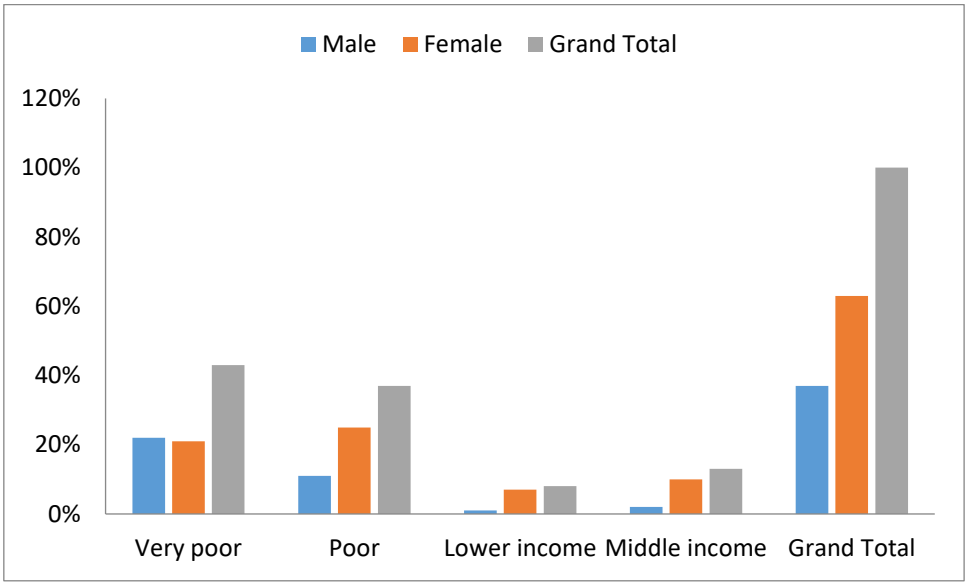
A total of 29% of respondents in the category of R500 to R1000 cost values lost their belongings. In the category between R1 001 and R5 000 cost value a total 13% respondents lost their belongings. The respondents who fell in category between R5 001 and R10 000, reflected a total of 16% who lost belongings. Those respondents who fell in the category between R10 001 and R50 000, had a total of 16% who lost their belongings.

Lastly, the respondents who fall in the 'not applicable' category reflected 25% which comes from those respondents who did not lose their belongings. It can be concluded that a larger number of respondents who lost belongings are those whose value in the R500 to R1 000 category and is an indication that the majority of the Goedgevonden village community members are low-income earners hence those who lost their belongings were those who were poor and vulnerable.

Drought has many implications for different sectors of the economy where it occurs. The most affected sector is the one that need water resources in order to operate. The impact of drought is seen where communities lost their belongings, reduced income leading to unemployment among those who depend on farm work, shortfalls in the capital of the farmers and financial matters that make it hard for the community to sustain their households (Vogel, 2000). There

were income losses for the members of the community in Goedgevonden as result of the losses in the farming activities such as livestock and crop production.

It can be concluded that as it was discussed, the majority of the members did not lose much in terms of belongings and income. The reason might be that the community members were not commercial farmers and some relied on grants to make ends meet. The social grants and the wage labourers managed to mitigate the situation through the money they received outside farming and from risk-sharing. The area had many people who were not working and the drought situation aggravated their vulnerability situation as some depended on land to make a living and it was also indicated above that the majority of the community members in the area were poor.



Source: Survey results (2017)

Figure 5.22: Respondents' position after drought in relation to gender

The results in Figure 5.22 show the respondents' position after the drought in relation to gender. A total of 43% is reflected by the respondents who felt that they were very poor after drought, with 22% male and 21% female. As it is reflected, one can agree with the results as it was stated in the study that the majority of the community members were poor.

A total of 37% is reflected by respondents who felt that they were poor because of the drought, with 12% male and 25% female. Also, a total of 8% was indicated by the respondents who indicated they were lower-income earners after the drought, where 1% and 7% was reflected by male and female respondents, respectively. Lastly, a total of 12% is reflected by the respondents who indicated that they were middle-class earners after the drought, of which 2% and 10% were male and female, respectively.

The reflection from Figure 5.22 indicates that the majority of the respondents in the Goedgevonden village felt poor and some very poor after the drought episode. Both male and female respondents shared the same sentiments, irrespective of gender. Females were in the majority, therefore the majority of them were vulnerable, more especially as women started to play an active role in agriculture as men counterpart were out of the village.

Respondents with the least percentage (8%) were those who said they were lower-income earners. It is evident that the community was poor, the drought impact had aggravated the socio-economic status of the community to the extent that they felt poor and very poor. Farmers and communities in the area should group themselves to establish drought risk assesssment, drought monitoring, drought assistance and drought relief schemes with the assistance of the municipality and disaster management offices. These teams would help to assist the community and ease the vulnerabilty of the community from the impact of drought. Situations such as these increase the need to mitigate situations and require the people to be more resilient through warnings, education, training and government intevention in order to bring the situation under control.

Box 7: Respondent's position after drought in relation to gender

Additional information on how respondents considered themselves after the drought episode:

- I consider myself poor because I lost my livestock.
- We lost source of income because of drought, now we rely on social grants.
- We lost crops, livestock died and we depend on social grants.
- My vegetable garden is no more producing and I used to sell vegetables, have to rely on grants.
- The livestock died because they ate undesirable (poisonous) grass due to drought.
- We lost money as I had to pay someone to collect water for me.
- I am not working, am very poor.
- The food price has risen we could not afford to buy food.
- I am a builder, I could not work because of drought, my work depends on water.
- I am working, my salary sustained me and drought did not affect me much but have to spend more assisting relatives buying foodstuff.
- We have to sell livestock at cheaper price because of drought.

Some of the community members were of the idea that they needed no formal policies or enforcement mechanisms to advance their quality of life. Their perception was that they had observed over the past years that if farmers wish to maintain a sustainable farming production

level, they need to apply conservation farming and use their own local capacities like ingenous knowledge to make rational socio-economic decisions.

Some respondence blamed the profound dependency syndrome on government. Dependency on government for social grants was high in the area, and this increased the community and farmers' vulnerability to drought and drought mitigation is still more response-based than risk reduction-based. The SLF, under livelihoods assets, suggested that human capital creates the quality and quantity of the workforce that is available to enable the community to chase various strategies and achieve their objectives. It can be concluded that respondents, irrespective of their gender position, experienced their financial position as being worse or much more worse because of the drought.

5.3 Conclusion

In this chapter, the socio-economic impact of the drought was analysed based on the respondents in the survey. It is clear that drought mitigation policies existed in the offices only as the area such as the Goedgevonden village had minimal plans to prepare community members for drought. From the social impact perspective, the respondents in this study reflected that support and mitigation was minimal and resulted in their vulnerability. Community-based participation was not fully practised, hence the community, subsistence farmers' crops and livestock suffered. The health centre did not have enough medication and personnel to mitigate the situation.

The economic impact analysis reflected that the majority of the Goedgevonden village community members were not working and mostly had to rely on subsistence and livestock farming. If drought comes, the source of income is intercepted leading to poverty. Many respondents had no management plan for crops and livestock during a drought episode. Communal farming is more traditional and when exposed to drought they lose severely, leading to poverty. The findings, recommendations and conclusion will follow in the next chapter as determined by the data collected.

Chapter 6
Findings, Recommendations and Conclusion

6.1 Introduction

Recurrent droughts are causing a lot of untold suffering especially to the rural communities in South Africa. This trend is no different for the Goedgevonden community in the north-western part of the country where the farmers were badly affected by the 2014/15 droughts. In the study, it was established that various factors contributed to the vulnerability of the community. The socio-economic characteristics of the sampled community indicated that they have experienced loss of livelihood sources, a decrease in household income, livestock and crop production that led to food insecurity. This chapter provides a summary of the study on the drought episode in Goedgevonden and the set of priority interventions and policy recommendations that will strengthen the adaptive capacity of the Goedgevonden community.

6.2 Summary of results

It was indicated in Chapter 1 that South Africa was hit by the El Niño event during 2014/15. The study showed that during 2014/15, the southern hemisphere summers in southern Africa suffered the worst recorded drought which left so many urban and rural areas devastated by the El Niño event (Rouault, 2015). El Niño is seen as a natural periodic event that is experienced every three to five years where an increase in temperatures is experienced and its duration could be up to two years (Rouault, 2015). The study examined the socio-economic impact of drought as result of this event on the community of the Goedgevonden village.

The study revealed that the majority of the respondents in the Goedgevonden village were women since they reflected 63% of the total number of respondents of the sampled community members. There were reasons behind the number of respondents being women; it could be that male counterparts moved to neighbouring towns in search of jobs and the women had to make decisions as household heads in the village. Studies have revealed that women excessively suffer the impacts of disasters and climate changes, sometimes as result of the cultural customs and disparity distribution of roles, power and resources especially in developing countries (Yavinsky, 2012). Women, as suggested by Yavinsky (2012), make up the majority of the world's poor population and are found to be more dependent than men on natural resources for livelihoods. When drought looms over agricultural production, men can use their savings and economic independence to invest in alternative income sources and will be able to adjust. Vulnerability in the Goedgevonden village is increased by the majority of

women in the area and the roles they play in their household because men have left the area in search of work; the women are left with children and old people as household heads. Conditions such as these increased socio-economic vulnerability, especially during times of drought.

The study has found that households with married couples were more resilient than those who were single, widowed and divorced in the community of Goedgevonden. The married couples were able to bounce back if faced with drought because family members were able to assist one another with different roles regarding their livelihoods. Social capital as suggested in the SLF is an important component that provides a buffer that could assist a household during times of hazards (UK DFID, 1999). It was found that there was more socio-economic resilience on the side of the solid family structures than on the ones made of single, widowed and divorced household structures in the Goedgevonden village.

The study has also revealed that drought has started to be a major hazard in South Africa and the same perception applied in the community of the Goedgevonden village. This statement was proven by the socio-economic impact of drought on the livelihoods of the community. Inadequate rainfall resulted in poor harvest, on the one hand, and poor pasture on the other that led to loss of livestock. The livestock became emaciated to the extent that farmers were not able to sell their livestock, and those who did sell cattle, lost income as they sold at reduced prices. The households could not produce enough food to sustain their families into the next harvest since they had to rely on external sources such as grants. Some had to abandon farming activities to search for work outside farming at the neighbouring towns which affected the family structure.

It was explained in the study that shortage of water was serious in the area since it aggravated the socio-economic conditions of the community. These were evident as water shortages increased the vulnerability context of the community where the community's capacity to mitigate the drought risk became difficult since Goedgevonden is a rural village that lacks resources. The study has shown that the failure of public water supplies in Goedgevonden forced many community members to fetch water from remote water supply sources. Boreholes and tap water were major sources of water before the drought but conditions changed after the drought. The community had only one dam that was not enough for the growing population of the village as was seen during observation of the area. Old boreholes were not maintained but the municipality did install new ones to mitigate the situation. The community required complete access to water in order to ascertain sustainable livelihoods. The study revealed that the Municipal System Act, Act 32 of 2000, suggested the need for assessment of the existing level of development in the municipality that must include the identification of communities

who do not have access to basic services during drought episodes. The national and local drought policies are there to assist in the planning process and to address factors that should be considered in building adaptive capacity in affected areas (UNISDR, 2009).

The study examined the competency from the side of local government and it was found that the community members did not have trust in the government with regard to their efficiency. Supply of water during drought was inefficient since water supply could not reach other areas because the trucks were insufficient for the entire community. The municipality did not see the need to increase the number of trucks in order to cater for the entire village, and community members felt that the water that was provided was not clean. It was discovered in the study that schooling was also not prioritised because learners had to frequently absent themselves from school. School children were forced to travel long distances with their parents to fetch water. Some farmers could not access fodder that was provided the by the government since they had to collect it themselves at their own expense from the town as one farmer responded. These reflected an incapacity on the side of the municipality because the farmers felt that they had to spend extra money for transport instead of getting support from the local government.

The municipality was not attentive of the hazards in Goedgevonden as this was reflected by the lack of vulnerability assessment to identify the hazards in the area. The study resonated vulnerability as a starting point for a policy-relevant framework where the significance of specific interventions aimed at improving the ability of people to adjust could be measured (Kelly and Adger, 2000). The municipality tended to be in contrast with this statement as it appeared to be a challenge to the municipality to construct a plan to mitigate the socio-economic drought situation of the community. Vulnerability assessment, capacity to adapt the concepts of socio-economic vulnerability, separated hazards impacts as well as attention on the institutional aspects is highly essential for disaster mitigation (Kelly and Adger, 2000).

The study found that the communication network between the community and the municipality was not fully functional. There was an inadequate communication network that led to vulnerability on the part of the community as subsistence farmers did not know what to do during the drought. It was stated by Vogel (1998) that the incorporation of preventive and socio-economic drought impact mitigation measures should be pursued to assist the government and community to realise sustainable development and reduction of disaster risk. The same was not adequately applied in Goedgevonden as some community members could not survive the situation and had to abandon their farms. The study reflected that the government lacked social access to the community. resulting in the community's socio-economic vulnerability to the drought hazard. Some district government officials did not see drought as a hazard and they acted reluctantly in terms of responses during the drought

episode. The level of relief and responses provided by the municipality were not enough as some of the subsistence farmers claimed that they did not receive assistance from the municipality at all.

It was found that since some of the respondents and officials in the area did not know the cause of the drought, they did not know which mitigations measures to implement. The study revealed that there was a need to have an early warning system in the area. The early warning and monitoring systems that looked at agriculture were perceived as important in evaluating the susceptibility of the sector particularly to drought; the range of support, if any, required to maintain a practical production sector and the extent to which national food security could be affected by drought (Leonard et al., 2008). The warnings should be clear, brief and consistent with a simple message. There were community members who were knowledgeable to recent communication networks that could offer assistance to the community with matters affecting them.

The study found that grazing lands needed fencing for livestock and crop framing. It was stated in Chapter 1 that the vulnerability of the Goedgevonden village was established by the past apartheid regime; it resulted in the loss of three quarters of land that was originally allocated to the community (TRAC, 1991). The living conditions were not suitable for the community as their cultivation land was no longer suitable for ploughing like it were twenty years before (TRAC, 1991). The past regime laws contributed in bringing the decline of available land of the community for livestock grazing and crop production. The land is limited for the increasing community and this issue makes one to be concerned about conflict that might arise in future for resource competition during drought episodes. Consultative local government intervention is required as urgent matter to address the challenges in the area.

It was also found that there was too much reliance on government support where community members lacked skills to help themselves during the drought episode. The community needs to take basic steps to reduce the impact of drought in developing skills that would mitigate drought impacts. Proper training of young farmers and women networking with other farmers from neighbouring villages could help with the sharing of ideas on how to cope with drought. Evidence suggested that respondents had serious challenges on poverty reduction, job availability and disaster risk reduction that requires vigorous attention for the Goedgevonden village.

6.3 Recommendations

The study therefore came up with the following recommendations:

6.3.1 Municipal level

It is recommended that the municipality needed to reinforce its preparedness planning towards drought as hazard and possible disaster. This can be done by ensuring that early warnings are clearly communicated to the community and done on time. The monitoring of the drought as a slow-onset hazard implies that the monitors have time to prepare, mitigate and even prevent the disaster from happening.

The municipality should ensure that water is accessible in the Goedgevonden village through maintenance of boreholes and construction of new boreholes to access deeper underground water to support the community and subsistence farmers during drought. The municipality needs to make sure the water management systems are effective. It was also reflected in Figure 5.11 in Chapter 5 that only 28% of the respondents had more than two water sources available after the drought. The municipality should ensure that new windmills and an extra storage dam are erected in the area to capture precipitation water. Except for water storage, dams can serve other various functions such as fishing, recreation and for scenic beauty of the area.

The municipality should fence the camps that farmers use since it was reflected that farmers practise communal land ownership in Goedgevonden, and to prevent farmers from over-grazing the land. During drought periods, there is shortage of grass for livestock to feed. Establishment of camps and fencing will assist in controlling the management system and the contingency plan will be easy to implement to mitigate the situation and eminent conflicts may be avoided.

There is a need for the local municipality to conduct community-based disaster risk assessment in the area. This will provide the community with a prospect to know which areas are at drought risk and they will be able to offer help to the municipality in reducing the socio-economic impact. Furthermore, the disaster risk management plan may assist with the planning process for socio-economic impact of drought mitigation since the plan can be effectively utilised before drought onset. Regular vulnerability drought assessment reports of the area should be submitted to the municipality as a way of discovering the drought on time.

6.3.2 Community level

It is essential that officials should not regard community members as target for dumping of projects and services since the community may develop a dependency syndrome. The municipality's role in disaster management is supposed to be that of facilitator rather than relief agent. Bridger and Luloff (1999) contended that policies and programmes that are planned to cater for community standards and needs are articulated by beneficiaries as this could

exacerbate the unbalanced relationship between the government and community members. Community members should be involved in matters that concern them. Projects must have community participation because this will promote a spirit of project ownership which, in turn, will make the community feel their importance and will work hard to protect the project.

Awareness campaigns should be supported and carried out in such a way that community members will be interested. Pamphlets should be used in a language that will be understood by the majority. Early warning information distribution should be through use of loud hailers because these can reach large audiences in the area. For the sake of saving water, the community should be provided with containers such as JoJo tanks, in order to save rainwater and the law enforcement should promote water conservation in the area.

6.3.3 Private sector level

There is need for the NGOs, poverty reduction fields and disaster management to diversify projects such as human rights, water sanitation, education and infrastructure development to bring development in the area and reduce the socio-economic drought impact. Projects such as these will increase resilience on the side of the community and cease those that foster a dependency syndrome in the Goedgevonden village. Involvement of the community in identification of projects will enhance project ownership by community members and is bound to be sustainable. Poverty alleviation projects will ensure food security in drought prone areas if the government, in conjunction with developmental partners, undertake activities aimed at reducing poverty (Republic of Namibia, 1997). There is a need to develop income-generating activities for women. Grain banks can be initiated in the Goedgevonden village for women groups as well as activities such as hair salons, knitting and embroidery to generate income in the area.

6.3.4 Farmers

Farmers in Goedgevonden should organise themselves to access cattle feed from other farmers in times of drought. Farmers in organised agricultural structures manage to cope better since they have access to a network of farmers in the neighbouring towns or province. This will require membership in organised agriculture and it will develop social media platforms. It is required that farmers keep the minimum number of livestock when heading into drought periods because farmers experience a great loss if they do not have control over their livestock numbers. Farmers should invest in drought resistant crops that can be used as feed during drought episodes and these crops will help mitigate the impact of the drought. Farmers must know the types of bushes that should be planted to support their livestock during the drought periods.

6.3.5 Education

As indicated in Chapter 5, 36% of the community members managed to reach secondary education, while 31% reached primary schooling and 30% of respondents did not attend school. This is a challenge because 30% is a high number for community members being illiterate. This could be a barrier during awareness campaigns in the area since some community members would not be able to read and write. The aim of public awareness and education programmes is to promote a self-reliant community that supports cooperation with officials responsible for disaster management activities (International Federation of Red Cross and Red Crescent Society, 2000). Education is an essential part of a disaster management plan for those who may be threatened by a disaster and can act as vehicle for access to information and technology. Education may enable the community to attain knowledge and skills to make radical decisions concerning socio-economic situations. Literacy development in the Goedgevonden village will be vital to enhance the community to make rational decisions on agricultural and non-agricultural development to improve their livelihoods.

6.4 Conclusion

The study has indicated that drought has brought escalating devastations in the Southern African region because of the El Niño event that hit the southern hemisphere countries where societies, economy and environment were affected. The study was on the socio-economic impact of drought on the community of Goedgevonden. It was indicated in the study that the apartheid regime removed the black community members of the area in 1983, resulting in the decline of capacity of the community to be socially and economically resilient. As stated in Chapter 1 that the community returned to Goedgevonden in 1998, they encountered shortage of land for crop and livestock farming. These conditions resulted in vulnerability of the community as they relied on livestock and crop farming to make a living. Some energetic men had to leave the area in search of work in neighbouring towns. Farming and household roles suffered and the drought episode aggravated the situation in Goedgevonden.

Rural Environment and Agricultural Development sent 342 bags of fodder to Gopane and Borakalalo in the North West Province as relief measures and these were signs of the drought episode in the area. Although drought results from various causes, one of the most common drought states occurs when crops and livestock suffer from severe moisture stress and is experienced when available water is less than the physiological needs. Poor rainfall led to rural households failing to harvest any meaningful produce, and even those who harvested some crops, it was not enough to sustain the livelihoods of the Goedgevonden village. The study has shown the majority of the communal farmers were losing drought power and the

high cost of inputs and inaccessibility of inputs had further compounded the challenges rural households confronted economically.

The Goedgevonden community suffered the drying of the dam, livestock emaciation, selling of livestock at low prices which impacted on their economic status. Schools learners have been absent from school which affected their academic performance. The study indicated that the relief measures by the municipality were not enough as the trucks that brought water most of the times could not cater for the entire population. As result the school attendance of their children and source of income of the workers were negatively impacted.

The study found that there was a need for a disaster management plan that would provide a legal basis for establishment of disaster risk reduction in order mitigate drought hazards by ensuring that the socio-economic conditions of the community of Goedgevonden would be protected. The study has detected that provision of funding for drought relief has not assisted farmers on time, the process seemed to be taking too long before the community could be helped and this in turn, increases the socio-economic impact of the drought. The study recommends that funding from local government should be effective, efficient and farmers must be assisted timeously.

A disaster management plan for the district should be induced for the sake of prioritising drought and water scarcity as hazard in the Goedgevonden village. The study attempted to add the understanding regarding the socio-economic impact of drought on the Ventersdorp Local Municipality and suggestions made will infuse a well-informed decision-making process for the municipality and the Goedgevonden village community. The study will assist the municipality to know precisely where to put more emphasis in alleviating the socio-economic impact of drought on the community in the future drought episodes.

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Appendix 1
Questionnaire

Introduction

My name is Siphiwe J. Caleni, I am a Master's student at the University of the Free State (Student number 2005074345). I am conducting research and my topic is: "Assessing the socio-economic impact of drought in Goedgevonden village, Ventersdorp Municipality in North West Province, South Africa". Your household has been selected from all households in the area for this interview to understand the impact of drought during the 2014 to 2015 period.

Your contribution will help us assess the socio-economic impact of drought in this area and the information you provide will only be used for academic purposes. Confidentiality and your right to privacy will be strictly observed. Please tick in the appropriate box or complete in the spaces provided.

Questionnaire

Number: ……

Date: …… Data collector: …….

Ward: …….

A. Demographic information.

1. Gender 1 ☐ 2 ☐
2. Age of household head
   1. Under 30 years ☐
   2. 31 – 40 years ☐
   3. 41 – 50 years ☐
   4. Over 50 years ☐
3. Marital status
   1. Single ☐
   2. Married ☐
   3. Separate ☐
   4. Divorced ☐
   5. Widowed ☐
   6. Other ☐ (Specify)…….
4. Level of education
   1. None ☐
   2. Primary ☐

3.Secondary ☐

4.College ☐

5.University ☐

6. Other ☐ (Specify) ……

5. Indicate the number of members in the household

1. 1 – 3 ☐
2. 2 – 6 ☐
3. More than 6 ☐

6. Indicate the number of years you have been staying here

1. 0 – 10 ☐
2. 11 – 20 ☐
3. More than 20 years ☐

7. What is the average income for the household per month?

1. Less than R1 000.00 ☐
2. Between R1 000.00 and R2 000.00 ☐
3. Between R2 000.00 and R5 000.00 ☐
4. Between R5 000.00 and R10 000.00 ☐
5. R10 000.00 and above ☐

B. Social impact of drought.

8. What was the impact of drought in your area during 2014/15? (Multiple responses are allowed). Choose.

1. Drying of water sources (river, lakes, dam, boreholes) ☐
2. Makes surrounding dryer (environment) ☐
3. Famine ☐
4. Crop failures/ poor crop quality ☐
5. Loss of livestock ☐
6. Poor health of livestock ☐
7. Food price increase ☐
8. Decline in livestock prices ☐

9. Other impact on livelihoods ☐

(specify)…….

9. Did you have any warning of drought before it started in 2014/15 period? 1 ☐ 2 ☐

10. If yes, how were you informed? (Multiple responses are allowed)
    1. TV ☐
    2. Radio ☐
    3. Word of mouth (friend, etc.) ☐
    4. Newspapers ☐
    5. Extension officer ☐
    6. Other ☐ (specify) ……

11. Did you believe when you were told that there would be drought? 1 ☐ 2 ☐

12. Do you think drought has become more or less frequent in the last 10 years?
    1. Less ☐
    2. More ☐
    3. No difference ☐
    4. Not sure ☐

13. How many water sources did you use before the drought onset?
    1. 1 - 2 ☐
    2. More than 2 ☐

14. What type/s of water source did you use before drought?(Multiple response is allowed)
    1. Stream/river ☐
    2. Borehole ☐
    3. Reservoir ☐
    4. Dam ☐
    5. Others ☐ (specify)……..……..

15. What type/s of water source did you use after drought?(Multiple response is allowed)

    1. Stream/river ☐
    2. Borehole ☐
    3. Reservoir ☐
    4. Dam ☐
    5. Others ☐ (specify)……..……..

16. Did you fence your water source for protection? 1 ☐ 2 ☐

17. How many grazing sites did you access before drought?

    1. 1 - 2 ☐
    2. More than 2 ☐

18. How many grazing sites did you access after drought?

    1. 1 - 2 ☐
    2. More than 2 ☐

19. Did you supplement fodder for your livestock before drought? 1 ☐ 2 ☐

20. Did you supplement fodder for your livestock during drought? 1 ☐ 2 ☐

21. Did you share grazing lands with anyone before drought periods? 1 ☐ 2 ☐

22. If yes, explain why?

    …….

    …….

23. Did you share grazing lands with anyone during drought periods? 1 ☐ 2 ☐

24. If yes, explain why?

    …….....

    .....

25. Did you feel like relocating because of drought? 1 ☐ 2 ☐

26. Did any member of your family migrate because of drought? 1 ☐ 2 ☐

27. If yes, explain why?

    …….....

    .....

28. Did you have access to clean drinkable water during drought? 1 ☐ 2 ☐

29. Did any of your family members have any health problem during drought? 1 ☐ 2 ☐

30. Did you have access to quality health care? 1 ☐ 2 ☐

31. If yes, explain why? ……..
……

32. If no, explain why? ……
……

33. Did the drought affect school attendance of any of your household members? 1 ☐ 2 ☐

34. If yes, explain how? ……
……

35. Was the assistance from municipality enough? 1 ☐ 2 ☐

36. If no, explain why? ……
……

C. Economic impact of drought.

37. What was the household source of income during drought period? (Multiple responses are allowed).
    1. Livestock farming (subsistence) ☐
    2. Agricultural farming (subsistence) ☐
    3. Petty trading ☐
    4. Wage labour ☐
    5. Skilled labour ☐
    6. Other ☐ (specify)……

38. What is/are the current form/s of income for this household? (Multiple responses are allowed).
    1. Livestock farming (subsistence) ☐
    2. Agricultural farming (subsistence) ☐
    3. Petty trading ☐
    4. Wage labour ☐
    5. Skilled labour ☐
    6. Other ☐ (specify). ……

39. Did you change your cropping system during the drought episode? 1 ☐ 2 ☐

40. If yes which systems did you apply? (Multiple responses are allowed)

    1. Shifting to quick maturing crops ☐
    2. Intercropping ☐
    3. Cultivating of vast area in different directions ☐
    4. Wide spacing ☐
    5. Other ☐ (specify)……..……..

41. How did the shortage of water affect your crops?

    1. Little ☐
    2. Very little ☐
    3. Very much ☐
    4. Not at all ☐

42. Did you have alternative source of water for your crops? 1 ☐ 2 ☐

43. If yes what are the alternative source of water?

    1 Hand watering system ☐
    2 Mini watering system ☐
    3 Bore hole ☐
    4 Other ☐ (specify)……..……..

44. Did you lose any belongings during drought? 1 ☐ 2 ☐

45. If yes estimate the costs.

    1 Between R500.00 and R1 000.00 ☐
    2 Between R2 000.00 and R5 000.00 ☐
    3 Between R5 000.00 and R10 000.00 ☐
    4 Between R10 000.00 and R50 000.00 ☐
    5 Over R50 000.00 ☐

46. How did you consider yourself after that drought?

    1. Very poor ☐
    2. Poor ☐
    3. Lower income ☐
    4. Middle income ☐

47. Explain your answer in Question 46 above.

……

……

……

Thank you for participating.