REVIEWING VULNERABILITY AND DROUGHT COPING CAPACITY: A CASE STUDY OF BORAKALALO COMMUNAL FARMERS IN NORTH WEST PROVINCE, SOUTH AFRICA

By

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DECLARATION

I, Oboneng Cynthia Nonjola, declare that this dissertation titled “Reviewing Vulnerability and Drought Coping Capacity: A Case Study of Borakalalo Communal Farmers in North West Province, South Africa” is entirely my work and it has never been submitted for a qualification at another institution. I declare that all sources used in this study have been fully acknowledged.

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DEDICATION

This work is dedicated to my mother Sylvia and my late father, Lucias Tshitannye. May his soul rest in peace. Thank you for believing in me even when I did not believe in myself. To my husband, Vukile Nonjola, and my children, Tshire, Enhle, and Phelo, your understanding and continued support is appreciated. Lastly, everyone who played a role in supporting me throughout this journey, I thank you.

ABSTRACT

Severe drought in South Africa has seriously affected livelihood conditions and economic growth (Schreiner, Mungatana and Baleta, 2018). The North West province is among the provinces affected since the drought began in 2013, and the communities, especially farmers, are still grappling with the long-term effects of drought. Livestock farming across the country was severely affected, although this is a much resilient commodity within the agriculture sector (Ngaka, 2012). Natural pastures were extremely overgrazed, causing livestock mortality and forced culling due to unavailability of fodder (Schreiner et al., 2018).

Drought is a serious challenge faced by developing and developed countries (Mmbengwa et al., 2015). Resource-poor communities such as communal farmers are mostly susceptible to drought, mainly because they do not have resources to manage the drought (Vetter, Goodall and Alcock, 2020). This assertion was true for communal farmers in Borakalalo village where this study was carried out. Borakalalo village is located in Ramotshere Moiloa Local Municipality in the North West Province. The purpose of the study was to assess drought vulnerability and coping strategies employed by communal farmers resident in Borakalalo village. One hundred (100) communal farmers were selected to complete a structured questionnaire using the non-probability purposive sampling method. A mixed-method design was adopted for the study. Both qualitative and quantitative data were collected and analysed using SPSS software.

It was found that there is a high level of vulnerability to drought among the farmers and coping capacity is limited. This was due to lack of resources, unfair distribution of government support, and incapacity to implement preparedness and mitigation measures. Farmers acknowledged government's effort in early warning systems and awareness; however, it needs to put more effort into capacity building and availability of resources to enable the farmers to implement disaster risk reduction measures. The communities are the first responders to any disaster; therefore, investing in capacitating them can have long-term benefits. The study further found that community participation in planning is minimal. This indicates that the needs of farmers may not be entirely considered when services are rendered.

The study concluded that the communal farmers in the study area are vulnerable to drought and made recommendations to policymakers for to enhance capacity

building initiatives. Furthermore, the study hopes to contribute to existing literature on vulnerability assessment and coping capacity.

Keywords: vulnerability, coping capacity, disaster risk reduction, mitigation, preparedness

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ACRONYMS AND ABBREVIATIONS

NDMF	National Disaster Management Framework
NGO	Non-government Organisation
PAR	Pressure and Release
SPSS	Statistical Package for Social Sciences
WHO	World Health Organisation
CARA	Conservation of Agricultural Resources Act
DMA	Disaster Management Act
FAO	Food and Agriculture Organisation
GWP	Global Water Partnership
HMNDP	High-Level Meeting on National Drought Policy
IFRC	International Federation of Red Cross and Red Crescent
IPCC	Intergovernmental Panel on Climate Change
NDMF	National Disaster Management Framework
SDG	Sustainable Development Goals
UNCCD	United Nations Convention to Combat Desertification
UNISDR	United Nations Office for Disaster Risk Reduction
WMO	World Meteorological Organisation

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

The general definition of drought that many scientists agree upon is that drought is the state of inadequate moisture resulting from deficiency of precipitation over a long time (Wilhite, 2005; UNDP,2010; Venton, 2012). According to Vetter (2009), South Africa is characterised by a large portion of semi-arid rangelands of which drought is a prominent feature. Drought can have irreversible consequences on any community's socio-economic and ecological outlook (NOAA, 2012), especially vulnerable communities with limited coping capacities (Wilhite, 2000).

Drought is different from other hazards because of its slow onset and creeping nature. Therefore, it is difficult to predict its onset or end (McKee et al., 1993). Furthermore, Gutiérrez et al. (2014) reported that the longer the drought takes, the more difficult it becomes for communities to recover from the effects. Moreover, Shiferaw et al. (2014); Wilhite, Sivakumar and Pulwarty, (2014) added that drought damages depend on its intensity, duration, frequency, the area affected, and that drought impacts continue to be felt afterward, even during normal precipitation periods. UNDP (2012) concur that the extent of drought is influenced by the capacity of those affected to manage the risks and successively deal with the impacts of drought. Worldwide, drought affects the agriculture sector the most, especially the smallholder and subsistence farming who are poorly resourced (Solh and van Ginkel, 2014; Bradshaw, Dolan and Smit, 2004).

The economy of South Africa’s agricultural sector has a commercial sector, which is generally well developed, and smallholder farming, which is commonly referred to as subsistence or communal farming (Johnston, 2019). The communal farming sector practice farming on communal land which is often owned by the community, tribal authorities, municipality or government rather than an individual. For this type of farming, overexploitation of resources, especially overgrazing, is often a major issue as resources are shared among farmers. Livestock farmers in this setup aspire to have many cattle and the numbers end up exceeding the carrying capacity of the land. Communal farmers therefore experience drought both as a natural and a man-made phenomenon.

The literature on drought shows that communal farming is a neglected area of research regarding the effects of drought in South Africa (Mmbengwa et al., 2015; Ngaka, 2012). Instead, the focus has been on commercial sector, particularly on livestock losses because of drought. Studies that reviewed the vulnerability and coping capacity of communal farmers pertaining to drought are lacking, especially in South Africa. The literature scan conducted by Vetter, Goodall and Alcock (2020) showed only one study investigated the impact of drought on communal livestock farmers in KwaZulu-Natal.

1.1.1. Impacts of droughts

According to the World Health Organisation, 40% of the world's population is affected by water shortages. In addition, about 700 million people could be displaced by 2030 due to drought (WHO, 2020). Governments must therefore plan and think proactively. It is reported that drought frequency, severity and magnitude has increased in recent years due to the changing climate (Wilhite, Sivakumar and Pulwarty, 2014). This is a concern because literature shows that many countries are still approaching drought in a reactive manner (Fasemore, 2017). For example, large areas of northeastern Brazil experienced drought between 2010 and 2013. Only afterwards did the government start to initiate proactive planning (Gutiérrez et al., 2014).

In India, reports indicate that India has been experiencing widespread drought conditions since 2015 affecting about 600 million people. Furthermore, it is projected that water demand will be double the obtainable quantity by 2030 (Roy, 2019). This affected the economy negatively since many economic sectors, including agriculture, were severely affected (The Borgen Project, 2016). It is reported that the majority of the agriculture sector in India relies primarily on rainfall; therefore, lack of rainfall presents a serious threat for the Country's economy (Udmale et al., 2014).

In Shanxi province in northern China, about three million people are reported to be in serious need of water; at the same time, lack of water is causing a third of the wheat crop to dry up (World Atlas, 2021). It is reported that eight provinces suffered crop losses, with wheat being the most affected. People and livestock were also affected by water shortages, forcing local populations to migrate. The United Nations Food

and Agriculture Organisation believe the 2011 wheat price increase was caused by the damage of wheat in China.

In Australia, the “Millennium” drought, which began in 1995 and spread throughout the country until late 2009, resulted in the depletion of reservoirs and dropped crop production drastically (Iceland, 2015). This forced many cities to desalinate and recycle grey water as a drought mitigation mechanism (Worldcrunch, 2020).

Iceland (2015) reported that in 2008, Barcelona imported water from France by ship due to drought. Syria is also reported to have suffered severe water shortages due to drought that occurred from 2006 through 2011 (World Atlas, 2021).

Africa has suffered from water scarcity in recent years (Shiferaw et al., 2014). With water scarcity, drought and its impact on this continent are inevitable. Fasemore (2017) asserts that though drought is a recurrent feature in Sub-Saharan Africa, it is worsened by poor infrastructure development, which is a significant setback in the region. The UNISDR (2011) supports this assertion by pointing out that any hazard become a disaster due to human elements such as poor usage of resources, poverty, lack of infrastructure maintenance, overgrazing, and environmental degradation.

In sub-Saharan Africa, drought is a regular feature affecting people and their livelihoods every year (Ventonm, 2012). The effects of drought are seen through aggravated poverty, loss of income, disease outbreaks, and migration, among others (Fasemore, 2017). However, even though this is the case, Wilhite (2000) and Glantz (1987) argue that drought risk reduction planning does not seem to be a priority for most countries in the continent. Studies indicate that little is being done to manage drought in sub-Saharan Africa (UNDP 2012; Wilhite 2000). According to Shiferaw et al. (2014), drought does not rank highest in the world’s highly devastating natural disasters; however, it one of the significant natural hazards in Africa, accounting for 25% of all-natural disasters occurring between 1960 and 2006 (Gautam, 2006 as cited by Shiferaw et al., 2014).

According to Shiferaw et al. (2014), the frequency of drought occurrence in Africa has been ranking high since the 1960s, with 382 reported drought events that affected 326 million people. Due to high rainfall variability, the Sahel, the Greater horn, and Southern Africa are affected by frequent and prolonged drought (Austin,

2008). The effects of these conditions exacerbate vulnerabilities of local and national economies (Shiferaw et al., 2014). Many countries, especially in Africa, experienced a reduction in GDP growth and threatened developmental advances due to frequent droughts (Fasemore, 2017).

According to Tadesse (2016), drought has been a major problem in Southern Africa, with countries like Malawi, Zambia, Zimbabwe, Mozambique, Swaziland, and Lesotho facing starvation in 2002, and over 16 million people affected. An extended dry period lead to extensive poor crop production in 2013 across Namibia, where approximately 780,000 of the population were classified as food insecure (Wilhite et al., 2014).

Drought affects countries in Africa differently; for example, in Zimbabwe, according to the national drought plan, the country lost about 60% of its cattle herd in 2015 due to drought. Frequent droughts caused poor agricultural production, loss of jobs and income for many people in the rural areas of Zimbabwe (Ndlovu, Prinsloo and Le Roux, 2020). According to Nangombe (2011), droughts have crippled the country in recent years. This has resulted in mass movement of people to neighbouring countries and shortened the life expectancy of the general population (Frischen et al., 2020).

Frischen et al. (2020) further point out that the smallholder and communal agricultural sector is directly affected as it comprises rain-fed systems. Nangombe (2011), reported that the 1991/1992 drought caused poor production of maize and rendered the majority of the population food insecure. It is also important to note that almost 80% of the population in Zimbabwe are dependent on rain-fed agriculture making them more vulnerable to drought and its adverse effects (Frischen et al., 2020).

According to ASSAR (2017), Botswana is semi-arid, therefore susceptible to drought. The Country has been affected by recent droughts, especially in the agricultural sector. Ziervogel (2017) reported that Ngamiland was severely affected by drought, resulting in poverty and some smallholder farmers stopping farming to consider other means of income. According to Ziervogel (2017), this resulted in food insecurity and poor nutrition, which affected vulnerable communities the most, particularly children. Like many countries in Southern Africa, a large portion of

Botswana’s population relies on agriculture, making it susceptible to drought (ASSAR, 2017).

Drought has a direct bearing on food security in Botswana as it leads to reduced yields in major crops like sorghum and maize (Ziervogel, 2017). The country's rural economy is primarily based on animal production, which is likely to be affected by drought (ASSAR, 2017). Animals have to travel long distances to drink water during the day when temperatures are at the highest (Austin, 2008). Drought results in increased livestock mortality due to heat stress and disease outbreaks caused by uncontrolled movements. Drought further affects distribution of resources (Vetter, 2009).

Similarly, South Africa is a generally dry country, which depends on rainfall for vegetation cover (Grundy and Wynberg, 2001). Ngaka (2012) reported that 65% of South Africa receives below-average rainfall, implying that most of the country’s agricultural activities occur under arid or semi-arid conditions. Recurring droughts in South Africa date back to the 1960s, 1980s, 1990s, 2002, and 2003 (Mpandeli, Nesamvuni, and Maponya, 2015) and continue with Northern Cape currently being the most affected province in the country. Vetter (2009) found that farmers will continue to experience drought risk therefore research must focus on finding adaptive measures. According to AgriSA (2019), more than 35% of South Africa’s communities in the rural areas have suffered the effects of drought since the 2013/14 hydrological year. The report further indicates that many maize producers were affected negatively by drought since 2013 through to 2019 (AgriSA, 2019).

Farmers, both commercial and subsistence, suffered substantial yield losses, reduced maize area, financial burden, and the outbreak of diseases such as foot and mouth and pests such as fall army worm (AgriSA, 2020). In addition, farmers experienced water shortages due to reductions in water storage levels and imposed restrictions. As a result, rural communities suffered food insecurity and increased poverty, which are common in South Africa (Ngaka, 2012). Drought commonly results in reduced income, food scarcities, extreme price increases and land degradation causing a drop in crop production (Shiferaw et al., 2014). The current drought that began during the 2013/2014 hydrological year has been recorded as the worst in thirty years (BBC, 2015; BusinessTechSA, 2015).

As a result, drought was declared as a disaster in eight out of nine provinces during the 2016/2017 year (Fasemore, 2017). Despite all the efforts put in place by the government and different organisations to respond to and mitigate the impacts, drought conditions continued to persist, leading South Africa to declare a national state of drought disaster in 2018/2019 and again in 2020/2021 (CoGTA, 2020). South African communal farmers are affected the most, as it is often the case during drought period (Mdungela, Tesfamariam Bahta, and Jordaan, 2017). In Limpopo, for example, Mpandeli, Nesamvuni and Maponya (2015) reported that drought affected crop, livestock and vegetation in some of the districts. In addition, marginalised smallholder and subsistence farmers and resource-adequate commercial farmers are affected by this drought.

It is reported that the water and food supply was very poor in the rural areas of South Africa during the early 1990s due to drought (Austin, 2008). The same is evident during the current drought as water levels in dams and reservoirs have decreased (Fasemore, 2017). As a result, the water and sanitation department imposed water restrictions on water use, including irrigation—this affected agriculture and food production across the country. According to Kalaba (2019), the Western Cape had to shed jobs in tourism and agriculture due to drought. Furthermore, areas in the Free State and North West provinces known for corn farming could not produce enough corn due to the drought (Fasemore, 2017). The Western Cape's City of Cape Town was the first and only city to report a looming day zero in 2018 due to water scarcity (Edmond, 2019).

1.2 Background of the study

During the last two quarters of 2018/2019, prolonged dry spells caused production deficit, shortage of food and increase in food prices in most parts of Southern Africa exacerbating food insecurity (AgriSA, 2020). South Africa was no exception as it has been fighting one of the worst droughts ever documented in recent years (DAFF, 2016). Raphela (2019) reported that in 2015/2016, KwaZulu Natal declared a drought disaster that affected subsistence farmers in rural KwaZulu Natal Province. Drought effects on the economy and agriculture sector, in particular, have been severely affected, causing increased food prices due to distressed key crops, such as maize (DAFF 2016).

Apart from having negative outcome on the crop and livestock production output in the country, the drought has also negatively affected the financial well-being of the farmers (AgriSA, 2020). The deteriorating drought condition in some other South African provinces has also negatively affected jobs within the agricultural sector (DAFF, 2016). The report released by National Agricultural Farmers Union (NAFU, 2019) indicated that more than 36 000 jobs were lost in the agricultural sector during the 2018/19 financial year. This, according to the NAFU (2019) report, translates into more than a R7 billion losses in Gross Domestic Product (GDP).

Droughts and dry spells continue to be the most devastating climate related hazards affecting rural livelihood (Jordaan, Bahta and Phatudi-Mphahlele, 2019). Drought occurs naturally because of persistent large-scale disruptions in the global circulation pattern of the atmosphere (Wilhite, Sivakumar and Pulwarty, 2014). However, as with other types of hazards, the social and economic vulnerability to drought leads to it being disastrous (UNISDR, 2004). This implies that the severity of drought impacts depends on how well people, the economy, and the environment cope (Wilhite, 2000). Drought can manifest itself in four different forms: meteorological, hydrological, agricultural and socio-economic. The hydrological, meteorological and agricultural droughts measure drought as a physical phenomenon. The socio-economic approach deals with drought in terms of supply and demand, tracking the effects of water deficit as it adversely affects the socioeconomic systems (NDMC, 2019).

A few studies have reported the impacts of drought on communal farmers around Africa (Fara, 2001; Matope et al., 2019). For example, Fara (2001) evaluated the vulnerability of communal farmers in Southern Namibia to drought. Recently Matope et al. (2019) undertook a study to investigate the measures employed by communal farmers to mitigate the impacts of drought on livestock production in Zimbabwe. Across Africa, the impact of droughts on communal farmers is evident. However, information regarding communal farmers' vulnerability and coping strategies needs more investigation to establish the level of exposure to drought risk of communal farming communities. It is also vital to assess the coping capacity or adaptability to the drought hazard by these farmers. Hence, this study is undertaken to review and assess the drought risks the communal farmers are exposed to and coping strategies employed. Recommendations made at the end of this study, will either

strengthen existing strategies or develop new ones to ensure that the communal farming system is sustainable and resilient to future droughts.

1.3 Study area

This study was carried out in Borakalalo, a village located in Lehurutshe in the North West Province. Lehurutshe is located within Ramotshere Moiloa Local Municipality, which falls under Ngaka Modiri Molema district municipality. Most of the people in the area are part of the Bahurutshe tribe, which is one of the main tribes of the Batswana people (Ramotshere Moiloa, 2017). The traditional customs and systems are still followed heavily in Lehurutshe and its surrounding villages (van Niekerk and Du Pisani, 2006). The people of Lehurutshe rely greatly on farming, primarily livestock and a small proportion of seasonal field crop farming as a form of livelihood. Maize is grown as a staple crop (van Bart, 2017). Some residents work or study in the cities, while some are involved in minor trades in the local markets to make a living (van Niekerk and Du Pisani, 2006). The area comprises of bushveld, farmland and dry truss thornveld on the slopes. Lehurutshe, like most rural areas in South Africa, suffers water shortages and land degradation (van Bart, 2017). It is generally a dry climate area with frequent droughts (TourismNW, 2020).

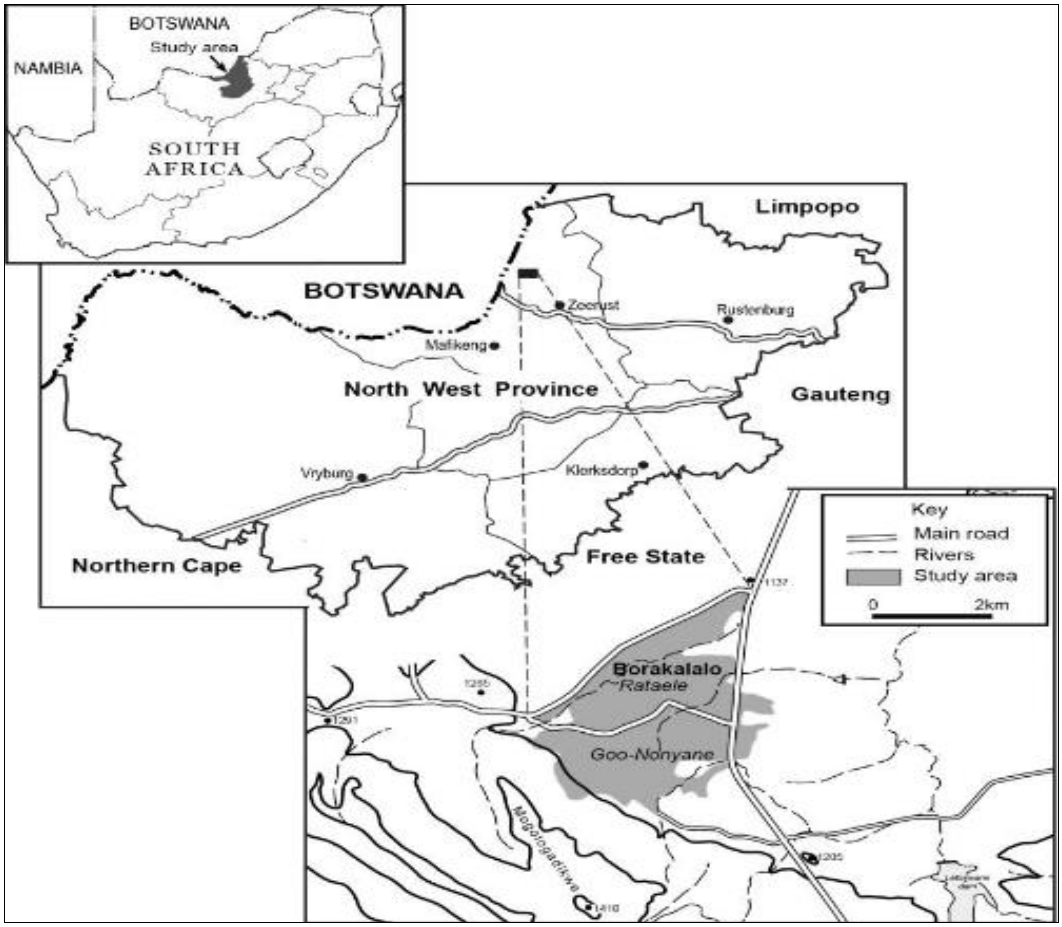

Figure 1.1: Map of Borakalalo Village
Source: Tabane (2016)

1.4 Research problem

The communal farming system is the oldest farming method practiced widely in rural households in developing countries, especially Africa (Mmbengwa et al., 2015). This farming system is associated with improved household food security in poverty-stricken areas of South Africa (Mdungela, Tesfamariam Bahta, and Jordaan, 2017); however, it is vulnerable to climatic conditions, especially drought (Mmbengwa et al., 2015; Ngaka, 2012). In addition, communal farming is associated with overstocking of livestock and overutilization of natural resources. This puts farmers on compromised situations such as overgrazing, depletion of water sources and land degradation among other disadvantages.

Resource-poor farmers, whose primary intention is to provide for the household and only sell surplus production (if any) for a minimal profit, mainly practice the communal farming system (DAFF, 2015). The communal farming system's contribution to the economy is minimal, as the primary focus is food security rather than profit-making (Mmbengwa et al., 2015). In South Africa, government

interventions are often not directed to this farming category. Farmers have to rely on indigenous knowledge and methods to cope with disasters, including drought. This study focused on this particular farming system to assess its vulnerability to drought and how farmers cope with the effects thereoff.

With changing climate and increasing frequency of natural disasters, particularly drought, communal farmers find themselves losing their livelihoods, as some of them have to shut down businesses (Vetter, 2009). Most commercial farmers have to decrease assets to adapt to current or future environmental challenges. However, communal farmers find it difficult to reduce their assets due to lack of resources, including proper education on farm management (NAMC, 2015). As a result of lack of resources, communal farmers become vulnerable to climatic hazards, particularly drought, and may not cope with adverse environmental changes. Communal farming is very crucial in South Africa as it promotes sustainable food security at household and communal levels (NAMC, 2015). Due to the persistent drought in South Africa, these farmers are becoming more vulnerable to food insecurity as their coping strategies are limited.

According to NAMC (2015), farmers are currently dependent on government interventions through drought relief, which is not sustainable for communal farmers. According to Ventonm (2012) cited in UNDP (2018), drought may have a number of different and interconnected social, economic and environmental impacts. Some of these include; decline in crop yields and thus increased food insecurity; livestock losses; forced sale of household assets; forced sale of land; increased crime; depletion of water for human use, a decline in health (e.g. due to malnutrition or lack of safe drinking water) and some economic impacts. With all these possible negative impacts associated with drought, there is a need to assess the level of vulnerability that communal farmers are exposed to and the coping capacities employed to counter the effects.

This study focused on Borakalalo, which is a small village in Lehurutshe in North West Province, South Africa. Borakalalo which is associated with water shortages and proneness to drought (Tabane, 2016). In addition, the area is situated in the west of South Africa, a part of the country, which is arid to semi-arid. This implies that it receives rainfall during the summer season when evaporation is high (van Niekerk and Du Pisani, 2006). The mean annual precipitation (MAP) of Lehurutshe is

approximately 560 mm with an evaporation rate of 1 600 to 1 800 millimeters per annum (Snijman, van Rensburg and van Rensburg, 2009).

The evaporation in Lehurutshe exceeds rainfall by about 300% (van Niekerk and Du Pisani, 2006). Due to the high rate of evaporation and a highly permeable landscape, the mean annual runoff (MAR) is approximately 3.1% of the precipitation, which is among the lowest conversion rates globally (Snijman, van Rensburg and van Rensburg, 2009). Drought data indicate that between 1920 and 1984, the worst droughts were experienced for 22 out of 64 years. This gives an average of one out of three years (van Niekerk & Du Pisani, 2006). Furthermore, underground water sources are stressed due to heavy demand, especially for stock watering (Tourism North West, 2021).

1.5 Research questions

The main research question that this study sought to respond to was: What is the level of drought vulnerability for the communal farmers of Borakalalo?

The sub-research questions addressed in the study are outlined below;

- What is the level of drought disaster risks and vulnerabilities among communal farmers of Borakalalo?
- How do farmers in the area cope with drought at the farm level?
- How are government policies and strategies taking into account the needs of these farmers?
- Is government inclusive in its approach when developing plans and strategies for communal farmers in this area?

1.6 Objectives of the study

1.6.1 Main objective

The study's main objective was to assess the vulnerability and coping capacity to drought among the communal farmers of Borakalalo.

1.6.2 Sub-objectives

The study focused on the following sub-objectives:

- To determine the level of drought disaster risks and vulnerabilities among communal farmers in Borakalalo village.

- To determine the strategies implemented by communal farmers to cope with drought at the farm level.
- To evaluate how government policies and strategies take the needs of communal farmers into account.
- To determine if government is inclusive in its approach when developing plans and strategies for communal farmers.

1.7 Significance of the study

There is an increasing concern worldwide about the ineffectiveness of current drought management practices primarily based on crisis management (Wilhite, Sivakumar and Pulwarty, 2014). Therefore, these practices are reactive and only treat the impacts of drought rather than the underlying causes for the vulnerabilities associated with the effects (Wilhite, Sivakumar and Pulwarty, 2014).

The recent drought that occurred since 2013 took a toll on the farming community, especially communal farmers. This study assessed the level of vulnerability with which the communal farming system of Borakalalo is exposed to drought and the coping mechanisms in place. The results will assist the government in drought capacity building plans to ensure that they are targeted, effective and customized to suit farmers' needs. This study will also assist the government in reviewing and aligning its policies and strategies for communities to cope better with future droughts. The need to understand the level of risk that farming communities are exposed to and their coping strategies to inform policy and decision-making processes is very important (Dams, Woldeamlak & Batelaan, 2008).

1.8 Research design

The research design is a practical plan to generate data (Kitchin, 2000). The research design empowers the researcher to unpack the research problem using the evidence gathered throughout the study (De Vaus, 2001). In addition, the research design is supposed to offer a suitable structure for a study (De Vaus, 2001). It is crucial to decide on the proper research approach as a first step in the research design process since it provides a framework for obtaining the relevant study information (CSC Scholarship, 2018).

1.8.1 Descriptive research

Descriptive research explains the factors of the population that are common, such as the demographics of the population and analyses it statistically (Swatzell and Jennings, 2007). In addition, it seeks to answer the questions, who, what, when, where, and how (Swatzell and Jennings, 2007). The descriptive research helps researchers understand respondents' perceptions, judgments, and intentions (Mittal, 2010). This study adopted this design to help the researcher draw conclusions based on the farmers' perceptions and choices in dealing with drought.

1.8.2 Explanatory research

This research design seeks to investigate a subject that has not been researched thoroughly before thereby answering the question "why?" (DeCarlo, 2018). The disadvantage of the explanatory research design is that the results are not conclusive due to lack of statistical power; however, it seeks to increase the researcher's understanding of a specific subject by understanding why things happen the way they do (CSC Scholarship, 2018). Since this study aims to acquire conclusive results on the issues concerning the communal farmers, this design will not be suitable for this study. Therefore, it was not adopted even though this design answers the what, why, and how critical questions in human science research.

1.8.3 Exploratory research

This type of study seeks to discover something new and exciting; as such, the problem is often not clearly defined (Elman, Gerring and Mahoney, 2020; QuestionPro, 2018). It is used to answer questions like what, why, and how (QuestionPro, 2018). Exploratory research design is often conducted during the early stages when a researcher wants to understand the topic generally and tests the feasibility of undertaking such a study (DeCarlo, 2018).

The main disadvantage of this design is that the results are often inconclusive (De Vaus, 2001). In addition, it uses smaller samples; therefore, the results cannot be interpreted or generalised accurately across the entire population (QuestionPro, 2018). Most research studies should provide conclusive results for the methods used in the study to be duplicated by other researchers. Because this research design tends to give inconclusive results, it was not appropriate for this study as this study is results orientated by nature. This study intended to make recommendations to

farmers in Borakallo village, therefore with inconclusive results that will not be possible.

1.9 Research methodology

The research methodology chosen to assess the vulnerability of the communal farmers resident in Borakalalo was the mixed-methods approach. The research methodology was determined by the kind of data that needed to be gathered and the nature of the research problem (De Vaus, 2001). The data collected can either be qualitative, quantitative or a combination of both methods (Vasileiou et al., 2018). The mixed methods research entails gathering and incorporating quantitative and qualitative data in one project and, therefore, may result in a more inclusive comprehension of the subject of enquiry (Leavy, 2017).

Furthermore, the mixed-method approach acknowledges that there are limitations with every method and that different methods can complement each other. The mixed-method approach further seeks to expand and reinforce the conclusions of the study and, therefore, contribute to existing literature (Schoonenboom and Johnson, 2017). Moreover, Wisdom and Creswell (2013) assert that the mixed methods give a voice to study contributors, particularly the respondents and ensure that the study findings are entrenched in the experiences of the participants.

1.9.1 Population and sampling

The study population comprised the communal farming community of Borakalalo village. The area consisted of 2 637 households with a population of 9 659 in 2011 (StatsSA, 2012). A sample size of 100 respondents was selected using a non-probability purposive sampling method. This type of sampling selects objects or individuals based on the purpose of the research according to the researcher's expertise (Etikan, 2016). This technique is preferred were the researcher intends to understand a particular phenomenon instead of making statistical inferences. In addition, it is also relevant were the population js small and specific (Naderifar, Goli, and Ghaljaie, 2017). This method was chosen because the researcher wanted people who only fit the study's research criteria and end goals (Acharya et al., 2013). The communal farmers were identified through the assistance of Extension Officers from the Department of Agriculture.

1.9.2 Data collection tools

According to Kothari (2004), data collection is the most crucial part of the research. Primary and secondary data were collected and analysed. Primary data was collected through questionnaires and observations, while secondary data was obtained from various sources such as published data sources. Such data sources were carefully analysed to ensure relevance to the study (Kothari, 2004).

1.9.2.1 Interviews

Gill et al. (2008) outlined three types of interviews used in research studies. First, the structured interview involves questionnaires that are administered verbally where an interviewer asks questions following a clearly defined scope (Gill et al., 2008). This type of interview offers little or no opportunity for follow-up questions. Semi-structured interviews have a list of key questions to guide the interviewer on important concepts. However, it allows for divergence and follow-up questions (Stuckey, 2013). Third, unstructured interviews are not structured at all. The interviewer asks questions based on the responses (Fox and Mathers, 2000). This study collected primary data through a community questionnaire survey approved by the University of the Free State Human ethics committee (UFS-HSD2020/1721/3011/21) and direct observation.

1.9.2.2 Observation

Observation is a type of data collection tool used in qualitative study where data is collected by observing the behaviour of the participants in a natural set-up (Bouchrika, 2020; CDC, 2008). In this dissertation, the researcher used the observation method as one of the tools for gathering primary information and data during research. The researcher observed the situation on the ground as interviews were being conducted. Observation also help the researcher to “read” the body language of the respondents and that assist with the reliability test (Mcleod, 2015).

1.9.2.3 Questionnaires

According to Hennink, Hutter and Bailey (2020), questionnaires are the primary tool for gathering key information in qualitative research. In this study, the researcher used a questionnaire as the primary tool to collect data while incorporating observational data and focus group discussions (Sileyew, 2019). The questionnaire

consisted of 21 main questions. However, with the inclusion of demographic and follow-up questions 32 questions, were asked.

1.9.3 Data analysis

The data was collected both qualitatively and quantitatively using a questionnaire. The questionnaire was categorised into five parts: part A was demographic information, part B was about communal farming, part C was drought impact and government interventions, part D was drought-related questions, and lastly, part E was about drought vulnerability and coping capacity. The targeted sample was 100 communal farmers, and the respondents completed all 100 questionnaires. The data was captured and coded using Microsoft Excel and analysed using SPSS. Quantitative data was presented in tables, bar charts, and pie charts, while qualitative data was presented descriptively.

1.9.4 Data validity and reliability

Reliability and validity are concepts used in research to evaluate the credibility of the research data (Price and Jhangiani, 2019). The reliability test evaluates the consistency of the measure, while validity evaluates the accuracy of the measure. The data collected from primary sources must be consistent with the literature if they are reliable and accurate (Oshagbemi, 2017). As such, the researcher compared the findings with literature to test the consistency According to Price and Jhangiani (2019), people's responses must be consistent and correlated for correlation questions, and similarly, observations of the same situation must be consistent. For this study, the researcher used a questionnaire and observation to collect data. A pre-test was carried out to ensure the reliability and dependability of the data collected. In addition, the results were triangulated with similar studies available through a literature review.

1.10 Limitations and delimitations of the study

1.10.1 Limitations

Conducting this study had its challenges and shortcomings. For example, the time was limited due to the Covid-19 pandemic prevailing in the country and worldwide. However, during data collection, the researcher adhered to all the national disaster management regulations, such as wearing a mask, sanitising, and keeping a safe distance from the respondents when asking questions. In addition, the researcher

and the research assistants filled the questionnaire themselves to avoid exchanging objects such as pens and questionnaires to eliminate the chances of virus transmission. Moreover, the researcher and the research assistants carried hand sanitizers along to sanitise their hands frequently to protect themselves and the respondents from the virus as it was reported that COVID-19 could be airborne (WHO, 2020). Dishonesty from respondents was also a possibility that was anticipated as a limitation.

1.10.2 Delimitations

The study focused only on the communal farming system of Borakalalo Village, which is under the administration of Ramotshere Moiloa Local Municipality. The research focused on assessing the vulnerabilities and coping strategies that farmers apply to cope with drought.

1.11 Ethical consideration

The researcher obtained ethical clearance as required by the University of Free State Human Research ethics. The researcher ensured that respondents participated based on written informed consent in line with the University's ethics policy. The respondents were advised about the purpose of the research before any data could be collected from them. The respondents were not coerced or forced to participate in the study. The respondents were informed of their rights to privacy and that their responses and identity would be kept confidential (Leedy & Ormrod, 2001; Mouton, 2001).

1.12 Research outline

This study followed the sequence stipulated below to achieve the objectives:

Chapter 1 gave an introduction and background to the study. This includes the description of the study area, problem statement, research objectives, significance of the study, limitations and delimitations of the study, research methodology, data analysis and presentation, outline of research chapters. Definitions of terms and a list of acronyms were presented in this chapter.

Chapter 2 outlined applicable national and international legislation and the theoretical frameworks that underpinned this study.

Chapter 3 reviewed literature and research related to the problem being investigated. A literature review was done to determine what other researchers concerning this

topic have done (Kumar, 2014). Documents such as articles, reports, thesis, and books were consulted.

Chapter 4 explored the research methodology. This was broken down into various elements of research methodology, including population and sampling selection, data collection tools, data collection procedure, and data analysis.

Chapter 5 presented results from an analysis of the data.

Chapter 6 concluded the study and made recommendations based on the results.

1.13 Chapter summary

This chapter provided an overview of what the study entailed in terms of the background, objectives and research problem. It further outlined the manner in which the study was conducted. The chapter also provided information regarding the study area, focusing on demographical information, climate, and socio-economic background. It provided the roadmap that was followed in collecting data, selecting the participants, analysing and interpreting data, and presenting the results.

CHAPTER 2: LEGISLATIVE AND THEORETICAL FRAMEWORKS

2.1 Introduction

Drought is a normal part of the climate across all climate regimes (Wilhite, 2005). As such, national governments must adopt policies that engender cooperation and coordination at all levels of government to increase their capacity to cope in the event of a drought (Sivakumar et al., 2014). Policies and strategies provide the framework and guidance to support the implementation of best management practices and suitable interventions (FAO, 2004).

The recurring effects of drought affect various economic sectors adversely due to the reactive nature of the response that is generally adopted by governments and land users (Brouwer et al., 2010). To change this reactive approach, nations must develop and implement drought policies (Wilhite, 2005). Therefore, this chapter investigated how international and local communities are doing in terms of drought policies and management. Furthermore, the theoretical framework applied in this study was discussed and contrasted with other frameworks.

2.2 International policies and legislation on risk reduction

Although there has been considerable discussions regarding adopting proactive drought management policies and strategies across the globe, only a few countries have developed and implemented them at national level (Wilhite, 2005). In 2005, the Hyogo Framework of Action was developed to accelerate and enable efforts to reduce disaster losses by 2015 substantially. The Sendai Framework followed the Hyogo Framework of Action for Disaster Risk Reduction 2015-2030, which aims to achieve substantial disaster risk reduction and decrease loss of lives due to disasters by 2030.

Although a lot of work has been done globally to address risk reduction, implementation by governments is insufficient (Worldcrunch, 2020). Hence Wilhite, Sivakumar, and Pulwarty (2014) argue that the global effort to initiate discussions around developing drought policies and strategies at national level need to be strengthened. According to Sivakumar et al. (2014), governments at the High-Level Meeting on National Drought Policy (HMNDP) (2013) especially from drought prone countries were encouraged to plan more proactively. During this meeting, heads of states acknowledged that drought is a global phenomenon that can be devastating if

no action is taken to counter its effects. The meeting further called for governments to develop and implement policies that are focused on all spheres of government, strengthening coping capacities and reducing vulnerability.

The national policy can focus on risk reduction by strengthening public education regarding drought and the understanding of fundamental sources of societal vulnerability to drought (Sivakumar et al., 2014). Furthermore, an effective drought management policy must advocate for enhanced monitoring and early warning systems (Mdungela, Tesfamariam Bahta and Jordaan, 2017). One of the outcomes of the HMNDP was the development of the national drought management policy guidelines, which identified three common approaches to drought policy that various countries have adopted (WMO and GWP, 2014).

The first approach, which is discouraged, is commonly followed by both developing and developed nations. This approach includes relief actions in the form of emergency support initiatives designed to provide money or other forms of support (WMO and GWP, 2014). This approach increases vulnerability by encouraging dependency and reliance, which reduce the communities' coping capacity. In addition, this approach rewards those who do not implement drought management strategies to some extent.

Countries like Australia moved away from this approach by completely removing drought relief from disaster relief schemes by encouraging farmers and other sectors in the rural areas to embrace self-sufficient practices to manage climate variability (White and Karssies, 1999). This was achieved through research, education and extension to support producers to adequately plan and cope with a changing climate and ensuring financial incentives are not given for unacceptable management practices (White and Karssies, 1999). The second approach focused on developing and implementing preparedness plans and policies, including legislative frameworks and effective measures developed prior to drought occurrence and sustained between drought periods by government or other parties involved (WMO and GWP, 2014). The third type of policy approach emphasizes the development of pre-impact government programmes or measures that are intended to reduce vulnerability and impacts (WMO and GWP, 2014).

In a study conducted by Bandyopadhyay, Bhuiyan and Saha (2020) in the state of Gujarat in India, it was found that one of the major reasons why drought is recurring in Gujarat is the inadequacy of the policy. The study further reported that the drought mitigation measures deployed in the State are inadequate, ineffective, and primarily reactive (Bandyopadhyay et al., 2020). Wilhite (2000) agrees that lack of good policy results in crisis management. The drought policy should establish a clear set of principles or operating guidelines to govern drought management and its impacts (Wilhite and Buchanan-Smith, 2005).

The overriding principle of drought policy should emphasize risk management by applying preparedness and mitigation measures (Sivakumar et al., 2014). Drought policies must underwrite four critical components of an effective drought risk reduction strategy: availability of timely and reliable information on which to base decisions; policies and institutional arrangements that encourage assessment, communication, and application of that information; a suite of appropriate risk management measures for decision-makers; and actions by decision-makers that are effective and consistent (WMO and GWP, 2014).

Even though the Sendai Framework and its predecessor the Hyogo Framework for Action are specifically for risk reduction they were not considered extensively for this study. However, since the Sendai Framework is currently an active risk reduction international framework, this study will look at this framework briefly and address drought management in the context of risk reduction. WMO and GWP (2014) reported that drought policies must underwrite the four critical components of an effective risk reduction strategy.

2.2.1 The Sendai Framework on Disaster Risk Reduction (2015-2030)

The Sendai Framework on Disaster Risk Reduction is a commitment by heads of states to reduce the risk of disasters and disaster-induced deaths and loss of property by 2030. Drought causes financial suffering across the globe (Walz et al., 2018). While droughts cause extensive financial losses in developed regions, it causes severe societal impact in developing countries, where the majority of the population depends on agriculture as the primary economic driver, especially subsistence agriculture (Walz et al., 2020).

A review of post-disaster needs assessments conducted by FAO in 53 developing countries between 2006 and 2016 revealed that droughts accounted for 83% of agricultural loss and damage between 2006 and 2016, with the cost amounting to over 29 billion US dollars (Walz et al., 2020). Drought affects agriculture and impacts energy, transportation, health, recreation/tourism, and other sectors. In addition, it directly affects water supply, energy and food security. Therefore, reducing disasters requires concerted, collaborative actions among a wide range of sectors (Aitsi-Selmi and Murray, 2015).

The implementation of the Sendai Framework requires the adoption of policies, strategies, and plans and a review and development of normative instruments at local, national, regional and global levels as well as quality standards and practical guidelines (UNISDR, 2015). Drought is a regular feature of climate (Bruwer, 1993); therefore, to reduce its impacts, planning must be done way before drought occurs (WMO and GWP, 2014). Furthermore, drought management requires forward-thinking and proactive planning.

2.2.2 Sustainable development goals

All United Nations member states adopted Sustainable Development Goals (SDGs) in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 (United Nations, 2015). The SDG has seventeen interconnected goals and recognises that development must balance social, economic, and environmental sustainability (Walz et al., 2018). Disasters in their nature reverse the efforts to achieve this balance, as people tend to overexploit the environment during disaster situations (UNISDR, 2015). Disaster risk reduction cuts across all development sectors; therefore, they must be prioritised to achieve SDG targets (Vogt et al., 2018).

There are twenty-five (25) targets related to disaster risk reduction in 10 of the 17 sustainable development goals, firmly establishing the role of disaster risk reduction as a core development strategy (Walz et al., 2018). However, only five goals directly linked to disaster risk reduction were referenced in this study. For example, Goals 1 and 2 can be achieved by reducing the exposure and vulnerability of the poor to disasters or building resilient infrastructure. People can be independent and find means to end poverty and hunger (UNISDR, 2015). This can be achieved through

proactive plans and strategies to empower the poor to live in balance with the environment in which they live.

Goal 6 calls for governments to ensure availability and sustainable management of water and sanitation for all by protecting and restoring water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes (United Nations, 2015). These natural resources can be very effective in reducing disaster risks, especially drought, by providing fresh water. Goal 13 implores governments to take urgent action to combat climate change and its impacts. Climate change increases the frequency and magnitude of climate-related disasters (United Nations, 2015). As such, strengthening the resilience and adaptive capacity to climate-related hazards and natural disasters in all countries must be heeded as a priority by governments.

Goal 15 calls for protection, restoration and promotion of sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halting, and reversing land degradation and biodiversity loss (UNISDR, 2015). This is in line with utilising nature-based solutions to combat disasters (Awal, 2015).

2.3 Drought management policies and legislation in South Africa

Various sectors in South Africa manage drought according to specific legislation; for example, the National Department of Agriculture and its provincial and district counterparts manage agricultural drought, while hydrological drought is managed through water and sanitation (Hassan, 2013). The Disaster Management Act, 2002 (Act No. 57 of 2002) as amended (Act No. 16 of 2015) is the primary legislation that deals with drought as a hazard in all its forms. The agriculture department manages drought by promoting natural resources management, which is done through the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983). The purpose of this Act is to control the utilisation of the country's natural agricultural resources to promote the conservation of the soil, the water sources, vegetation, combating of weeds and invader plants (CARA, 1983).

The National Water Act, 1998 (Act No. 36 of 1998) protects water resources in usage, development, conservation, management, and control. In terms of this Act, the country developed a national water resource strategy that provides a framework for managing water at the regional or catchment level in defined water management areas (National Water Act, 1998). The national water policy provides for the

management of bulk water supply under normal or drought situations (Hassan, 2013). The National Disaster Management Framework (NDMF) was promulgated in April 2005 to set out the DMA's implementation guideline. It is a working document for Disaster Risk Reduction in the country (IFRC, 2011).

2.3.1 The National Disaster Management Act (DMA)

According to IFRC (2011), the emphasis of the DMA is essentially four-fold. It institutes an institutional framework for disaster management. In addition, it imbeds a comprehensive policy framework and the development of strategic planning structure for disaster management. Furthermore, it unpacks the process and procedure for the classification and declaration of disasters occurring or threatening to occur in the country. Moreover, it provides strategic direction for the funding of post-disaster recovery and rehabilitation. The primary focus of the DMA is firmly on disaster risk reduction and providing for disaster risk reduction, emergency preparedness, swift and effective response, and post-disaster recovery.

The DMA defines a disaster as *"a progressive or sudden, widespread or localized, natural or human-caused occurrence which causes or threatens to cause death, injury or disease; damage to property, infrastructure or the environment; or disruption of the life of the community. Furthermore; its magnitude exceeds the ability of those affected by the disaster to cope with its effect using only their resources."* Applying this definition to a drought disaster, farmers are expected to implement disaster risk reduction measures to reduce the worsening of drought in their communities.

In terms of the DMA, forward planning and consistent assessment of adapted strategies are necessary to curb the devastating impacts of drought (Bruwer, 1993). The South African approach to drought in the past was reactive in nature, wherein farmers were subsidised for financial losses (Ngaka, 2012). This approach encouraged dependency on the government, with farmers not implementing disaster risk reduction measures (Shikwambana, 2016). Section 57 of the DMA emphasizes that the government will not assist in situations where a disaster such as a drought occurs due to the negligence of the affected population. Based on the definition of a disaster, people who cannot cope are given priority to receive assistance from the government. Therefore, the definition of disaster management as stated above will

be revisited to answer some questions posed by this study and critically analyse the farming community's responses documented in this study.

2.4 Conceptual models

Conceptual models of vulnerability assessments are needed to manage disasters. Therefore, this study will apply the BBC model, which was developed by Bogardi and Birkmann, 2004, and Cardona 1999/2001. This model focuses on addressing disaster risks and severe events to promote the adaptation to climate change in a global context (UNU-EHS, 2011). This study chose this model as it focuses mainly on exposure to natural hazards, climate change, and social vulnerability. The climate hazards and social vulnerability part of this model is the focus of this research as this research investigates drought as a case study in a vulnerable community. Indices consist of indicators in four components: exposure to droughts; susceptibility as a function of nutrition and the general economic framework; coping capacities as a function of governance, disaster preparedness, and social and economic security; and adaptive capacities to future natural events and climate change.

2.4.1 The BBC model

According to the BBC model, vulnerability assessment is about damage assessment and evaluation of exposed and vulnerable elements and coping capacities (Jordaan et al., 2017). This model further recognizes vulnerability as having environmental, social and economic facets linked to sustainable development that reduces disaster risks (Birkmann, 2013). This implies that the affected population has to be identified and assessed according to its vulnerability to essential services, infrastructure and physical structures (Jordaan et al., 2017). Furthermore, the BBC model argues that vulnerability reduction has two opportunities: before the disaster strikes, during and after the disaster (Birkmann, 2013).

This concept emphasizes pre-disaster risk reduction measures, response and relief planning (Ardestani, Fisher, and Balzter, 2012). However, by the nature of its design, this study will only focus on two opportunities of the model; one before the disaster strikes and after the disaster has taken place. It remains crucial to assess vulnerabilities and adaptive capacities of those at risk pre- and post-disasters to ensure effective risk reduction and adaptation (Birkmann, 2013). This motivated the

selection of this model for this study. Most conceptual models focus on risk pre-disasters. However, this is reactive and proactive.

The BBC framework demonstrates that addressing potential intervention tools that reduce vulnerability, such as early warning in the social, economic, and environmental sphere, is key to disaster management (Birkmann, 2006). In addition, the BBC framework focuses not only on the insufficiencies of the vulnerable people but also on their abilities to cope with a disaster before it occurs (Jordaan et al., 2017). Jordaan et al. (2017) used this model in a study undertaken to evaluate Eastern Cape communal farmers' vulnerability. Jordaan et al. (2017) looked into various vulnerability indicators embedded in social, economic, and environmental exposures. Furthermore, the BBC model reveals how social, economic, and ecological domains interrelate, demonstrating that the social domain is built within both the ecological and the economic domains, as shown in Figure 2.1 (Jordaan et al., 2017).

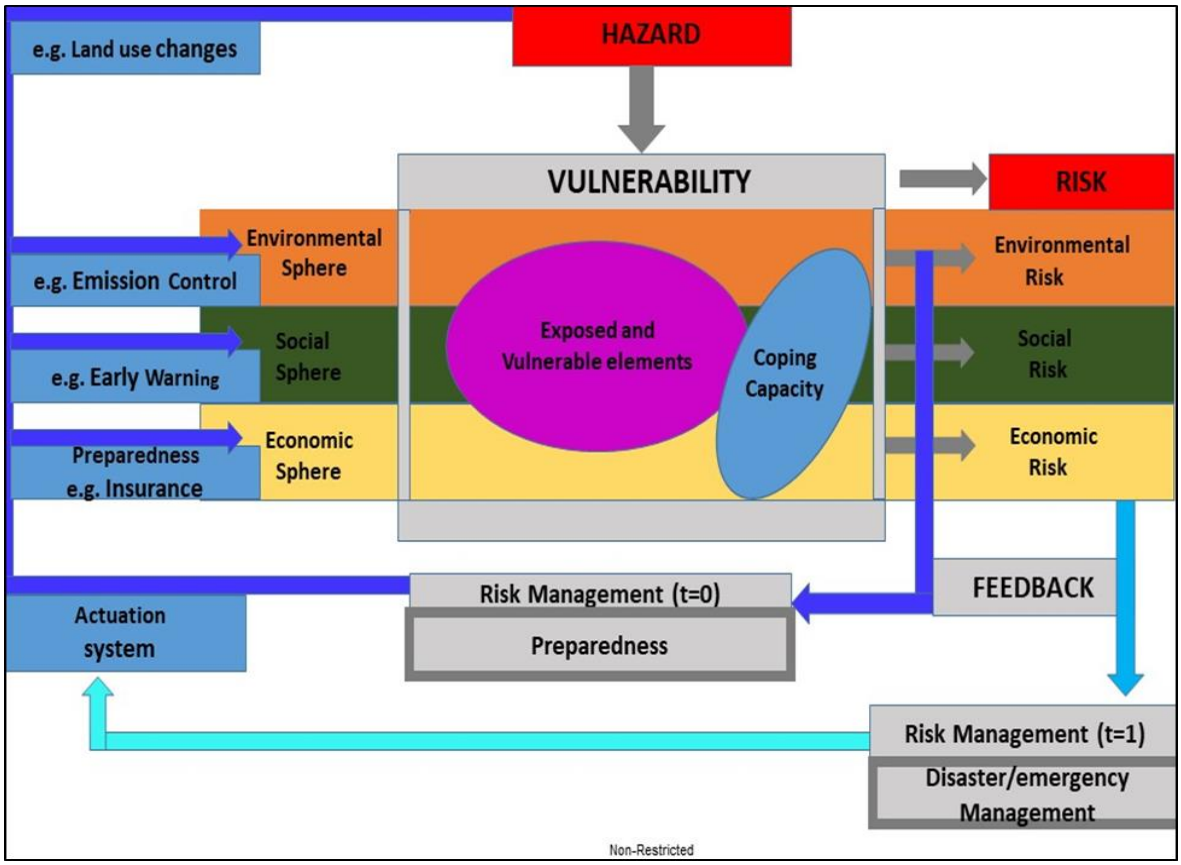

Figure 2.1: BBC Framework
Source: Jordaan et al. (2017)

2.4.2 The pressure and release (PAR) model

The PAR model considers the socio-economic background as an essential aspect of the hazard becoming a disaster. This model also shows how root causes of vulnerabilities interact with dynamic pressures and unsafe conditions to produce a disaster situation. In the PAR model, the vulnerability assessment tests the exposure of *'elements at risk'* to drought as a hazard while taking in consideration the analysis of the causal factors leading to vulnerability (Jordaan et al., 2017). Various methods are available in the literature to assess drought vulnerability (van Niekerk et al., 2016). However, there is no single method to evaluate the vulnerability (Birkmann, 2013). In addition, drought vulnerability assessment is a complex process because different factors contribute to a drought becoming a disaster (UNISDR, 2004).

The PAR model asserts that a disaster cannot exist without vulnerability. Several researchers have used this model to assess vulnerability and risk. For example, Awal (2015) applied the PAR model in a study to determine Bangladesh's vulnerability to disasters. The study found that lack of access to resources, unsustainable livelihoods, decision-making, political influence, environmental degradation and ineffective approaches of governments to disaster risk reduction are some of the significant elements that increase vulnerability (Awal, 2015).

Hamis (2018) in Kondoa District in Tanzania to assess drought vulnerability conducted a study using a similar approach. The finding revealed that the population's exposure to drought was caused by, low production, poor infrastructure, land degradation, decreased price of produce, poor trade and a poor farming method, and insufficient precipitation. The study further indicated that government did not have plans that adequately address the matter.

The PAR model has also been used in ecosystem-based disaster risk reduction (Eco-DRR) to demonstrate how socio-economic activities can weaken the physical environment and present an opportunity for disasters such as drought or flooding (van Niekerk et al., 2016). It also demonstrates that lack of access to resources, poverty, population growth, unemployment and lack of government plans and policies contributes to people's overexploitation of the environment (IPCC, 2012). Furthermore, the atmosphere is under enormous pressure from unsafe conditions

and exposure to hazards, making it vulnerable to disasters, including drought (UNISDR, 2004; Ebi, Lavell, and Mechler, 2012).

According to IPCC (2012), three components of vulnerability must be considered when assessing susceptibility, exposure, and coping capacity. Brown, Ecclestone, and Emmel (2017) argue that the measurement of vulnerability is related to the extent to which the socio-ecological system is exposed, susceptible, and fragile or lacks resilience and response capacities to deal with the adverse impacts of drought as a hazard. When assessing drought vulnerability, several factors must be considered; for example, climate change and climate variability may increase the vulnerability and frequency of drought; at the same time, socio-economic activities such as land degradation and misuse of natural resources may also contribute to the exposure (Hoffman et al., 2009).

Moreover, an unhealthy ecosystem cannot protect human settlements from being affected by disasters as it is supposed to (UNISDR, 2004; IPCC, 2012). Although the PAR model provides a wide understanding of vulnerability, it focuses on natural hazards and offers a basis for observing livelihoods and vulnerabilities (Twigg and Greig, 2001). However, this model has limitations as it does not measure vulnerability per se; instead, it explains various forms of vulnerabilities and measures to mitigate them (Twigg and Greig, 2001). For this reason, this study adopted the BBC model to answer the overarching question that this study seeks to answer. However, the PAR model was applied to the study findings to assist the investigation in explaining the various forms of vulnerabilities of the study community and measure how to mitigate them.

2.5 Conclusion

Literature indicates that most droughts that occur are human-induced. As such, there is a need to develop policies and strategies and to strengthen disaster management legislation. Efforts are being made globally to address disaster management plans and policies. However, little is being done to ensure successful implementation. This is demonstrated by the fact that some of the Hyogo Framework of Action targets, for example, were not met in 2015 according to the plan. The United Nations member states made further development efforts according to the Sendai Framework,

Sustainable Development Goals, among other agreements, to ensure the mainstreaming of disaster risk reduction.

The South African Disaster Management Act, 2002 (Act No 57 of 2002) emphasizes the move to proactive risk reduction. However, literature indicates that the country still has a lot of work to do to achieve this paradigm shift. This is also exacerbated by the nature of drought as a slow onset hazard. It is very difficult to define its beginning or end due to the complexity of drought, making drought quantification a challenge. As a result, many countries struggle to plan for drought proactively; hence, the approach is primarily reactive. Bruwer (2003) indicates that South Africa addressed drought through drought relief by assisting farmers with fodder and production inputs. This measure is still being practiced currently, according to Ngaka (2012), and it is said to encourage reliance rather than resilience of farmers.

This chapter further analysed and discussed the theoretical frameworks that are relevant to this study. The BBC model was selected as the most pertinent to this study for two reasons: 1) vulnerability assessment is not only about damage assessment, but about the evaluation of exposed and vulnerable elements as well as the coping capacities and 2) it recognizes vulnerability as having social, environmental, and economic aspects which are linked to risk reduction and sustainable development. This model was used in conjunction with the PAR model to explain various forms of vulnerabilities and measures to mitigate them.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

Drought is a climatic condition known to be a problem to farming practices (Mmbengwa et al., 2015). Research indicates that droughts are increasingly posing a challenge for farmers, particularly communal farmers in South Africa, and will continue to do so in the future (Vetter, 2009; Ngaka, 2012). According to Johnston (2019), the economy of South Africa's agricultural sector has a commercial sector, which is generally well developed, and smallholder farming, which is commonly referred to as subsistence or communal farming. Approximately 87% of agricultural land is occupied by about 47 000 farms. Two million smallholder or subsistence farmers (Johnston, 2019) occupy the remaining 13%, sharing common characteristics such as inadequate access to funding, land, inputs, markets as well as high levels of vulnerability (Mmbengwa et al., 2015). These farmers face drought as a slow-onset disaster (Mmbengwa et al., 2015).

3.2 Drought as a hazard

Drought is a slow onset disaster and affects a large geographical area, a character that sets it aside from other hazards (Ventonm, 2012). Due to its creeping nature, drought has no specific and generally accepted definition (UNISDR, 2004). The definition of drought must be application and region-specific and depends on the commodities affected (Wilhite, Sivakumar and Pulwarty 2014; Ventonm, 2012). Drought is a different kind of a hazard (Wilhite, 2005). Firstly, it manifests slowly over time, therefore its impacts are not felt immediately. Secondly, it has no universally accepted definition; therefore, its meaning must be described according to the region in which it occurs and the affected sectors. Thirdly, it spreads across a large geographical spectrum and its impacts are non-structural, therefore difficult to quantify (Wilhite, 2005).

Drought is defined both conceptually and operationally because of its complex characteristics (NDMC, 2016). As a result, scientists have agreed on a general conceptual definition, which characterizes drought as a decline in precipitation in a specific area over time (Hisdal and Tallaksen 2000; Wilhite and Buchanan-Smith 2005; Wilhite 2005). According to Svoboda et al. (2015), this conceptual definition is essential in establishing drought policy. On the other hand, operational definitions

help define the onset, severity, and end of droughts (Svoboda et al., 2015). According to Wilhite (2000) and Svoboda et al. (2015), four types of drought have been defined operationally being (i) meteorological, (ii) agricultural drought, (iii) hydrological drought, and (iv) socio-economic drought. The different types of droughts are depicted in Figure 3.1 below.

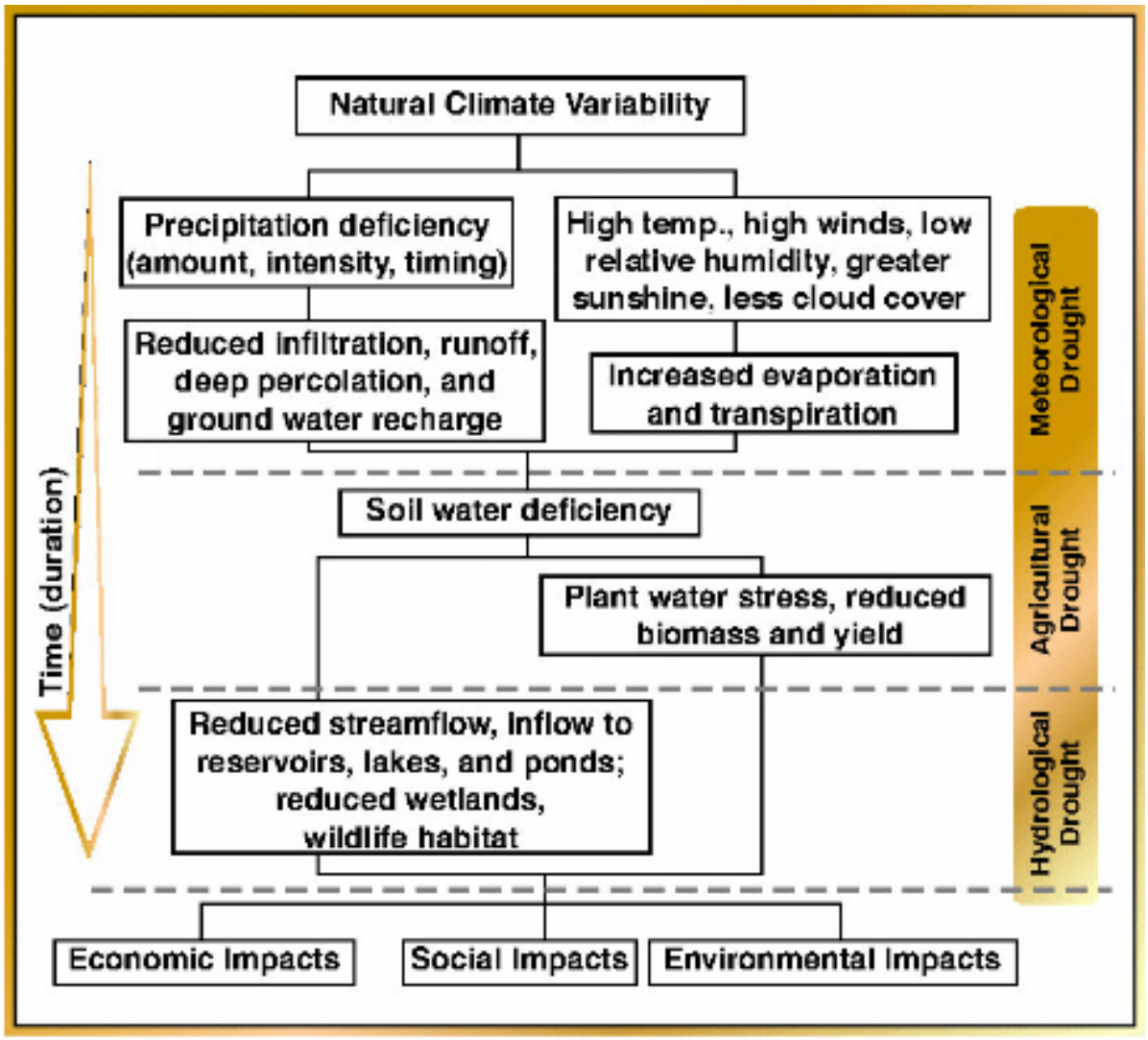

Figure 3.1: Relationship between meteorological, agricultural, hydrological and socio-economic drought
Source: UNISDR (2006)

3.2.1 Meteorological drought

Meteorological drought is defined as a substantial period of below normal or no precipitation (NDMC, 2019).

3.2.2 Hydrological drought

Hydrological drought occurs when natural water storages fall below the normal capacities (NDMC, 2019). It may also occur during average precipitation when demand exceeds supply (UNDP, 2010). Hydrological drought is a broad term used to define the deficiency of surface and underground water (Khan et al., 2018). This could be in lakes, dams, wetland areas, and reduced river discharge (Solh and van Ginkel, 2014).

3.2.3 Agricultural drought

Agricultural drought takes place because of insufficient moisture required for average vegetation and crop production (Vetter, Goodall and Alcock, 2020). According to UNISDR (2004), this type of drought is usually a result of lack of precipitation and inadequate ground or surface water which affect agricultural production; hence agricultural drought.

3.2.4 Socio-economic drought

Socio-economic drought results from all other types of droughts as they begin to affect the socio-economic aspect of the community (NDMC, 2010). The UNISDR (2004) describes this type of drought as one wherein the economy's ability to cope is exceeded by direct and indirect impacts of human activities. During this type of drought, the competition between demand and supply intensifies due to lack of water, shortage of food, collapsing of the economy and livelihoods because of drought (Vetter, Goodall and Alcock, 2020).

3.3 Impacts of drought

The impacts of drought often follow predictable progressions distinguished by the socioeconomic wellbeing of the affected communities (Wilhite, 2000). This implies that the effects of drought are influenced by the ability of the affected population to cope with drought. Examples include crop failures, which result in food shortages, shortage of clean drinking water leading to diseases, hunger, and political conflicts, shortage of energy and transportation as well as uncontrolled movement of people. However, reports indicate that the impacts in developed regions are commonly

economic rather than social. This is seen in agricultural production losses, increases in food prices, transportation costs and high-energy tariffs. Wilhite (2005) argues that quantifying the impacts of drought may be difficult because of the complex nature of this hazard. At the global level, drought can cause irreparable ecological damages and permanent social damages in developing countries where the poorest and vulnerable communities are most at risk (Vetter, 2009). Drought impacts affect many sectors of the economy, either directly or indirectly, reaching a large geographical area (Ding, Hayes and Widhalm, 2011). Direct effects include reduction in crop productivity, depletion of pastures, reduction of forest productivity, high fuel load increasing fire risk, shortage of water, high animal mortality, and damage to the natural habitat (Singh, Bantilan and Byjesh, 2014).

The consequences of direct impacts include indirect effects such as reduced revenue, high food prices, joblessness, food shortage and mass migration (FAO, 2019). According to the IPCC (2007), major parts of the planet will become hotter and drier in the future due to climate change. One-fifth of the earth is covered by dry land area, which is prone to drought and lack of water. At the same time, the planet has to cope with increasing demands of growing populations (IPCC, 2007). Human activities will continue to interfere and put pressure on the environment, resulting in land degradation, high water demand, desertification, and greenhouse gas emissions, exacerbating drought's frequency and severity (Vetter, 2009).

Drought impacts manifest in various interconnected forms, including environmental, social and economic effects (UNDP, 2012). In addition, food insecurity, as another impact of drought, affects a large number of the world’s population. In curbing food insecurity, localised agricultural production, including home gardens, should be encouraged to improve household food security (Adey, 2007).

The table below summarises the impacts of drought as discussed below.

Table 3.1: Direct and indirect impacts of droughts as they affect the social, economic, and environmental wellbeing of society

Primary impacts	Secondary impacts
SOCIAL	
Interrupted distribution of water	Migration
High water demand	Conflicts
Unsustainable marginal lands	Poverty, unemployment

Depleted grazing Low crop yields	Shortage of food
Retrenchments of workers	No income
Increased food insecurity	Malnutrition and famine; civil strife and conflict
High pollution	Diseases
Unequal distribution of drought relief	Social unrest
Increased veldt fires	Unsafe conditions
Increased migration	Social conflicts
ENVIRONMENTAL	
Damage to natural habitats	Loss of biodiversity
Reduction in productivity	Reduced income and food shortages
Decreased water levels	Lower accessibility to water
Reduced cloud cover	Plant scorching
Increased temperatures	Increased fire hazard
Increased evapotranspiration	Crop withering and dying
More dust and sandstorms	Increased soil erosion; increased air pollution
Decreased soil productivity	Desertification and soil degradation (topsoil erosion)
Decreased water resources	Lack of water for feeding and drinking
Reduced water quality	More waterborne diseases
ECONOMIC	
Livelihood affected	Increased prices for farming commodities
Food and energy shortages	Drastic price increases; expensive imports/substitutes
Loss of crops for food and income	The increased expense of buying food, loss of income
Reduction of livestock quality	Sale of livestock at reduced market price
Water scarcity	Increased transport costs
Loss of jobs, income, and property	Deepening poverty; increased unemployment
Less income from tourism and recreation	Increased capital shortfall
Forced financial loans	Increased debt; increased credit risk for financial institutions

Source : FAO (n.d)

3.3.1 Environmental impacts

Environmental losses result from land degradation, loss of vegetation, loss of biodiversity, soil erosion, drying water sources such as dams, rivers and lakes (Vetter, 2009). Environmental effects may be short-term or long-term and irreversible (NOAA, 2012; Vetter, 2009). For example, land degradation may cause permanent loss of a natural ecosystem (Solh and van Ginkel, 2014). Malherbe et al. (2020)

found that significant die-offs of a mega herbivore species occurred in the Kruger National Park during the extreme drought that occurred in the year 2015/16. In addition, the lack of water contributed to the growth of blue-green algae, which could poison the animals (Pretorius, 2016). According to Raphela (2019), the 2015/2016 drought affected subsistence farmers in the rural KwaZulu Natal province.

3.3.2 Social impacts

The social impacts of droughts can be seen in the poor functioning of social relationships due to conflicts or migration, unequal distribution of resources, outbreaks of diseases, safety and security threats (NOAA, 2012). Social impacts cut across economic and environmental implications because humans interact with the environment and are active players in the economy (Brouwer et al., 2010).

According to NOAA (2012), migration of people seeking better opportunities due to drought is a serious problem for many countries, especially where agriculture is an economic driver. People migrate from rural to urban areas or adjacent countries searching for food (Muyambo, Jordaan and Bahta, 2017). For example, the study on the impact of drought in Africa, conducted by Fasemore (2017), found that drought-induced migration was common for countries such as Namibia, South Africa and Botswana. Fasemore (2017) indicates that people have migrated from Angola to Namibia while Zimbabweans migrated to Botswana and other adjacent countries including South Africa.

South Africa has seen a massive influx of people from SADC because farming, a leading economic driver in rural Africa, is severely affected by drought (Modi, 2003). This deprives rural areas of valuable human resources since migrants seldom return home after a drought (Muyambo, Jordaan and Bahta, 2017). The disadvantage of this mass migration is the pressure it puts on the socio-economic infrastructure of recipient countries or urban areas, which ultimately results in shortage of resources and social conflicts (Fasemore, 2017).

3.3.3 Economic impacts

Drought impacts cut across many economic sectors; however, agriculture is directly affected because it relies on water (Ding, Hayes and Widhalm, 2011). Farmers suffer loss of income, which result in secondary impacts such as loss of jobs, reduced business, increased credit risk and ultimately a decline in tax collection by the

affected country (FAO, 2015). The recent drought in South Africa left farmers with increased financial strain, rising carry-over debt, and many considering looking for alternatives in urban areas (AgriSA, 2019). In addition, poor and vulnerable farm workers become even more susceptible to poverty (Van Loon, 2015).

Various forms of drought also affect other economic sectors including agriculture, tourism, energy, transport and other sectors that primarily require water to function (Ding, Hayes and Widhalm, 2011). For example, Mathivha, Tshipala, and Nkuna (2017) analysed rainfall versus tourist arrival information from 1963 to 2015 and found that South African tourism was affected negatively during drought periods as the number of tourists in the country decreased during drought periods. This affected the economy negatively as tourism contributes immensely to the economy of the country (Manzoor et al., 2019).

3.4 Defining drought vulnerability

Vulnerability can be defined in various forms depending on who and what is vulnerable (Brown, Ecclestone and Emmel, 2017). For example, Singh, Bantilan and Byjesh (2014) define vulnerability to climate change as the extent to which a system is exposed to climate change effects and therefore unable to cope. On the other hand, Wisner et al. (2003), describe vulnerability in relation to the capacity of the system, individual or group to cope or deal with a hazard.

The Disaster Management Act, 2015 (Act No 16 of 2015), defines vulnerability as "*the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards".* These definitions indicate that vulnerability is multifaceted and multi-dimensional and that the worldview definition of the word vulnerability depends on how one looks at it (Wisner et al., 2003). The common factors drawn from the definitions of vulnerability are susceptibility to a hazard and capacity to cope (Wisner et al., 2003).

The vulnerability may change with time depending on social responses and shift in hazardous events (Wilhelmi and Wilhite, 2002). This implies that it can be measured based on projected damages to livelihoods and not only the immediate effects after the occurrence of a disaster (Wisner et al., 2003). Additionally, vulnerability constantly changes due to changing technology, population growth, behaviour,

practices and policies (Wilhelmi and Wilhite, 2002). According to Blaikie et al. (1994), it is very difficult for vulnerable people or systems to go back to the original state after a disaster. Wisner et al. (2003) associate vulnerability with poverty or lack of access to resources. For example, Vetter, Goodall and Alcock (2020) suggest that during the 2016/17 drought in KwaZulu Natal in South Africa, commercial farmers' livestock survived better than communal or small-scale farmers due to lack of resources.

Ngaka (2012) found that the most vulnerable to drought are mainly rural communities and resource-poor farmers. Furthermore, several studies seem to concur that vulnerability is linked to global processes such as population growth, urbanisation, poor developmental processes, financial pressures, socioeconomic inequalities, poor governance, and environmental degradation, among others (Ebi, Lavell and Mechler, 2012; Singh, Bantilan and Byjesh, 2014). Twigg and Greig (2001) classified vulnerability into three categories. Physical vulnerability focuses on the most visible areas of exposure such as land, climate, environment, health, skills, and labour. Social or organisational vulnerability and capacity focuses on how society is organised, the vulnerability is less visible and less understood in the community; and lastly motivational or attitudinal vulnerability and capacity that explains how people in a society view themselves and their ability to affect their environment.

3.5 Factors influencing drought vulnerability

3.5.1 Population growth

Drought vulnerability in Africa is believed to be influenced by many factors, including population growth (Shiferaw et al., 2014). Population growth has a huge implication when accompanied by poverty and ineffective policies (Rani, 2016). Rani (2016) further reported that population growth puts pressure on inadequate natural resources and result in unmanageable exploitation of natural resources, leading to ecological damage (Rani, 2016). This environmental damage may result in crop failure, making it difficult for subsistence farmers to provide for their families (Angerer, Fox and Wolfe, 2016). The marginalised and vulnerable are forced to exploit the environment when they run out of options. This exploitation leaves the environment exposed to various hazards, including drought.

3.5.2 Climate

Agriculture is susceptible to climate variations and weather due to dependence on natural resources, especially water and soil (Wilhite, Sivakumar and Pulwarty, 2014). Most of the farming activities depend on rainfall in sub-Saharan Africa (Shiferaw et al., 2014). Therefore, farming is vulnerable to weather and climate related hazards. Drought frequency is reported to be increasing at a high rate across the globe due to changing climatic conditions (Wilhite, Sivakumar and Pulwarty, 2014).

3.5.3 Environmental degradation

According to WHO (2020), land degradation is a direct effect of human interaction with nature, where human activities interfere with the natural environment. Humans overexploit the natural resources, pollute the soil and cause soil erosion (Angerer, Fox and Wolfe, 2016). Rani (2016) indicates that a healthy environment can protect humans against natural disasters through ecosystems, which act as buffers for natural disasters. For example, if wildlife becomes extinct, vulnerable rural poor adjacent to the reserve lose their income from ecotourism.

3.5.4 Technology

Reports indicate that drought will continue to affect economic sectors negatively around the world. Therefore, there is a need for management strategies that incorporate technological options to enhance farmers' and agribusiness resilience to drought and other climate-related hazards (Shiferaw et al., 2014). Access to technologies that reduce risk and enhance productivity, provide improved access to markets and enhance general knowledge must be governments' priority (Hellmuth et al., 2007 in Shiferaw et al., 2014).

3.5.5 Government policies

Governments must develop policies aimed towards risk reduction through the creation of awareness and strengthening of early warning systems (Wilhite, Sivakumar and Pulwarty, 2014). Developing a drought policy and preparedness plans can be challenging however, the outcome can decrease the community's vulnerability significantly (WMO, 2014 and; GWP, 2014).

3.6 Drought coping capacity

Coping is the ability to act effectively and decisively with limited resources (Wisner et al., 2013). It involves managing resources especially in unusual, abnormal and

adverse situations. According to Ndlovu (2012), resources may be land, livestock, seed and labour. The capacity of the affected subject to cope with or manage the hazard is a core element in assessing the subject's vulnerability to that particular hazard (Adey, 2007). Ebi, Lavell, and Mechler (2012) assert that capacity assessment is a baseline for understanding the level of vulnerability and it is employed in many vulnerability assessment approaches. Literature indicates that the relationship between vulnerability and capacity is inversely proportional. This implies that when capacity increases, vulnerability decreases and vice-versa (Khan et al., 2018).

The vulnerability of communities to drought depends on that community's physical, social, environmental and economic characteristics (Goswami et al., 2017). The vulnerability of a community if any of these characteristics are compromised or weakened are likely to increase the risk of drought becoming a disaster. For example, according to Jordaan et al. (2017), regular dry periods may be experienced as drought by communal farmers because of the lack of or limited resources. Communal farmers are affected every time there is drought in South Africa (Mdungela, Bahta and Jordaan, 2017), making it essential to invest in coping with temporal water shortages.

In a study conducted in the Eastern Cape to determine the farmer's choice of coping strategies, Mdungela, Tesfamariam Bahta and Jordaan (2017) reported three main coping strategies used by farmers to sustain productivity as irrigation, diversification and drought-resistant crops/breeds. Most farmers opt for measures such as type of crop used, irrigation and tillage (Wilhelmi and Wilhite, 2002). Wilhite (2000) indicates that the approach to drought has been mainly reactive, with minimal focus on risk reduction. As a result, communities' vulnerability has been growing.

Literature indicates that research on drought coping strategies is available however; implementing such procedures remains a challenge (Jordaan et al., 2017). This is evident as South Africa is still suffering the impacts of drought (DAFF, 2020) that manifested in 2013/14 hydrological year, which resulted in all nine provinces declaring a state of drought disaster in 2016 (NDMC, 2016). Farmers need to make effective livelihood changes to cope and adapt to current or future environmental challenges brought about by climate change and natural hazards such as drought (Vetter, 2009). Farmers must be encouraged to implement drought coping

mechanisms that promote self-reliance and resilience rather than dependence on drought relief or assistance. Wilhite, Sivakumar and Pulwarty (2014) argue that drought relief assistance provided to the affected populations increases vulnerability to future droughts by promoting dependence on government relief.

In agriculture, measures such as the use of a variety of cultivars and adaptable livestock breeds can be considered (Yegbemey et al., 2014 and Johnston, 2019). In addition, farmers can adjust planting dates in line with the forecast to avoid crop losses. Ngaka (2012) found that most farmers consider purchasing livestock feed as a coping mechanism; an option that is costly for small-scale farmers including communal farmers. According to Ngaka (2012), commercial or large-scale farmers sold their livestock in large numbers as a technique to cope with drought, while small-scale or emerging farmers preferred to keep their livestock and only sold when necessary. Mmbengwa et al. (2017) argued that these categories of farmers, including communal farmers, prefer to keep their livestock for social, cultural and financial reasons. Ngaka (2012) asserts that these farmers often consider selling their livestock late into drought when their conditions have deteriorated and the prices have dropped. The Agriculture Forestry and Fisheries department has developed coping measures including relocation of livestock to better areas for grazing, purchasing licks and other supplements, fetching water for livestock instead of allowing them to walk for long distances, and early weaning of calves (DAFF, 2008).

3.7 Summary

Literature indicates that drought is a regular condition of the African weather system and that its frequency will increase over the next 100 years, with dire consequences for biodiversity (Bruwer, 1993; Hoffman et al., 2009). Furthermore, vulnerability to drought can be influenced by social, economic and environmental exposure of the systems to the hazard. Therefore, it is crucial to assess the level of vulnerability across social, economic and ecological spheres to gauge the susceptibility of a given community to plan correctly. The planning must consider climate change, government policies, population growth, dynamics and available resources, including innovation and technology. Literature has indicated that drought is a regular feature of any climate; it is most prevalent in Africa for various reasons, including mismanagement of resources and political issues. It is also apparent that the main

contributing feature to drought vulnerability is poor planning that is reactive. As such, governments must strengthen drought policies and include affected communities.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

Research methodology is the method followed to answer research questions using several techniques, interpreting and analysing gathered data and drawing conclusions about the research data (Bouchrika, 2020). A research methodology according to Sileyew (2019) is a route map followed by researchers to carry out a study. The research methodology defends the design choices as it shows how the chosen research methods and techniques support the aim and objectives of the research and the validity and reliability of the results achieved (Jansen and Warren, 2020). This chapter aims to discuss and justify the method chosen by the researcher to answer the research questions.

The methods involved in research are qualitative, quantitative, and mixed methods. This study utilised a mixed-method research design to answers to the research questions and address the key research objectives (Sileyew, 2019). This research design was chosen as it accommodates qualitative and quantitative techniques. It gives the researcher the flexibility to analyse data using statistical analysis that caters for qualitative and quantitative studies.

4.2 Research design

The research design offers a suitable structure for a research study (De Vaus, 2001). With the aid of the research design, the research problem is solved using the evidence gathered throughout the study (De Vaus, 2001). In addition, the research design outlines a suitable structure for a study (De Vaus, 2001). Deciding on the research approach is an important part of the process of the research design since it provides a framework for obtaining the relevant study information (CSC Scholarship, 2018). Some types of research designs are discussed below.

4.2.1 Descriptive research

Descriptive research explains the common or predominant factors of the population that already exists (Swatzell and Jennings, 2007). In descriptive research, the results are not predicted or manipulated as is the case in experimental or inferential research. In addition, it seeks to answer the questions, who, what, when, where, and how (Swatzell and Jennings, 2007). In market research, descriptive research helps researchers understand customer perceptions, judgments and intentions (Mittal, 2010). This study adopted this design to help the researcher draw conclusions based on farmers' perceptions and choices in dealing with drought. The researcher sought to understand the vulnerability and coping capacity of communal farmers in Borakalalo village.

4.2.2 Explanatory research

This type of research design describes the subject of the study and thereby answers what, why, and how questions (Swatzell and Jennings, 2007). Explanatory research design does not provide conclusive results due to its lack of statistical strength; however, it seeks to increase the researcher's understanding of a specific subject (CSC Scholarship, 2018). Since this study aims for conclusive results on the issues concerning communal farmers, this design will not be suitable for this study. Therefore, it will not be adopted even though this design answers the what, why, and how critical questions in human science research.

4.2.3 Exploratory research

This type of study seeks to discover something new and exciting; as such, the problem is often not clearly defined (Elman, Gerring and Mahoney, 2020; QuestionPro, 2018). It is often referred to as the grounded theory approach or interpretive research as it is used to answer questions like what, why, and how (QuestionPro, 2018). Exploratory research design is usually done during the initial phases when a researcher wants to test the viability of conducting a more broad study (DeCarlo, 2018).

The main disadvantage of this design is that the results are often inconclusive (De Vaus, 2001). In addition, it uses smaller samples; therefore, the results cannot be interpreted or generalised accurately over the entire population (QuestionPro, 2018). Most research studies should provide conclusive results for the methods used in the

study to be duplicated by other researchers. This design's tendency of not giving conclusive results made it not favourable for this study, as this study is results orientated by nature. This study hopes to make recommendations to the farmers of Borakalalo, therefore with inconclusive results that will not be possible.

4.3 Philosophical worldview

Philosophical worldviews refer to a set of basic theories that inform one's actions or choices (Petersen and Gencel, 2013). Philosophical worldviews inherently reflect the researcher's views about the world (Kivunja and Kuyini, 2017). According to Tabane (2016), the researcher's worldview must be known beforehand as it influences the final research outcome. This implies that researchers are always biased towards their philosophies or life experiences (Krauss, 2006).

Furthermore, Peterson and Gencel (2013) assert that the researcher's worldview influences the choice of research methods used to conduct a study. The different philosophical worldviews exist. For example, the post-positivist (positivist), interpretivist (constructivist), participatory (advocacy), and pragmatist (Krauss, 2006). The positivists/post positivists seek for an objective reality that exists out there in the world. They hold a deterministic philosophy; based on careful observations and measurements, they try to make inferences to a general truth (Krauss, 2006).

The positivists have been criticised because they rely on what already exist. As such, they do not investigate issues in depth; they describe the existing reality (Dudovskiy, 2009). For this reason, this study will not adopt the positivists' view, as the survey is not dealing with the status quo. Drought is an ongoing, slow-onset disaster that will not accommodate the positivists' idea. Interpretivism involves the researcher interpreting the world and it acknowledges the researcher's interest (Krauss, 2006). This implies that from a constructivist point of view, any construction or interpretation is as valid as the other, as long as it works within a specific context (Petersen and Gencel, 2013). Therefore, for this study, subjective reality is sought. The questionnaires are designed to extract honest answers from the farmers, as recommendations were based on the farmers' responses.

Raphela (2019) reported that farmers, mainly subsistence farmers tend to exaggerate crop damage in their farms because of what they hope to get from the government as compensation. Therefore, this study did not adopt the interpretivists'

view. The study was mindful that the information collected from the farmers through questionnaires and interviews might be subjective in reality. The pragmatic paradigm integrates experience, knowledge and action (Frey, 2018). It puts emphasis on knowledge and experience that can be acted upon. They also believe that knowledge, thoughts and beliefs must be viewed in terms of their uses and success.

Pragmatists believe that research philosophy is primarily determined by the research question. Depending on the nature of the research question, the pragmatics may integrate both positivist and interpretivist views within a single study depending on what the study seeks to address. Furthermore, pragmatism research philosophy accommodates multiple research methods including the mixed-method research approach (Almpanis, 2016). Since this study uses a mixed-method approach, pragmatism was adopted as the study's philosophical worldview.

4.4 Research approach

The research approach is the plan that will be followed by the researcher to collect, analyse, and interpret data (Labaree, 2021). Therefore, it should be guided by the nature of the research problem. Furthermore, it determines the framework with which the required study information will be obtained (Sileyew, 2019). The three types of research approaches are discussed below.

4.4.1 Qualitative approach

The qualitative research approach method describes phenomena based on people’s experiences (Jansen and Warren, 2020). Furthermore, the qualitative method explains the researcher’s observation by contextualising and interpreting the data gathered (Bouchrika, 2020). However, qualitative research has some disadvantages. Firstly, generalising the information collected through the qualitative method may not be correct, as some factors will remain unique from one individual to the next (Rani, 2016). Secondly, Gaille (2018) argues that data collected through qualitative methods lack rigidity because it is based on individual perspectives, which may change. As a result, the data gathered is only reliable at the time it is collected. Thirdly, the results obtained cannot be extrapolated to the whole population with a level of confidence as in quantitative analyses because of two reasons: (1) qualitative method uses a smaller sample size and (2) the findings cannot be tested

for statistical significance or whether the results are due to chance (Ochieng and Atieno, 2009).

4.4.2 Quantitative approach

The quantitative method involves a systematic process for obtaining information about the world formally and objectively (Regnault, Willgoss and Barbic, 2018). Quantitative approaches are commonly used in explanatory studies (USC Libraries, 2010). The advantages of using a quantitative research design is that it uses a larger sample, making it more reliable and consistent (Almpanis, 2016). Moreover, it is easy to replicate the study due to the data collection protocols, which are standardised (Bhandari, 2020).

The Quantitative research method does not provide any space for personal inferences; therefore, there is no chance for biases in the results (Bhat, 2018). However, quantitative research design also has shortcomings, including the fact that it does not consider the meaning behind social phenomena (Miller, 2020). It does not allow for follow-up on questions and the truthfulness of the responses cannot be verified since there is no face-to-face encounter with the participants ((Ayres, 2019; Bouchrika, 2020).

4.4.3 Mixed method approach

The arguments stated above indicate the importance of using mixed methods so that qualitative and quantitative approaches can complement each other. This study, therefore, adopted the mixed methods approach. The advantage of mixed methods research is that quantitative and qualitative data is collected and integrated in a single project and, therefore, may yield a more complete understanding of the subject under investigation (Leavy, 2017). Furthermore, this approach acknowledges that all methods have shortcomings. The use of different techniques can be integrated to complement each other. Mixed-method research provides an opportunity to strengthen and broaden research conclusions by combining qualitative and quantitative research components, therefore, contributing enormously to the existing literature around the subject (Schoonenboom and Johnson, 2017). Wisdom and Creswell (2013) assert that mixed methods represent the views of the participants by ensuring that the results are founded within the experiences of the participants. Mixed-methods allow for the application of both qualitative and

quantitative methods in one study (Regnault, Willgoss and Barbic, 2018). Schoonenboom and Johnson (2017) have identified several purposes of using mixed methods, which can also be viewed as advantages. Mixed methods provide an opportunity for triangulation through convergence and corroboration of results from different methods. It provides credibility to the research findings and contextual understanding through qualitative approach as well as generalisable, external valid findings or broad relationships among variables uncovered through quantitative approach. It also provides a diversity of views by combining the perspectives from both the researcher and the participants (Schoonenboom and Johnson, 2017).

4.5. Study population

A research population is an extensive collection of individuals or objects that are the focus of a study (Almpanis, 2016). The study population consisted of communal farmers from Borakalalo village. According to Census 2011, Borakalalo had a total population of 9,659 with 2,637 households in 2011. The study was restricted to Borakalalo village only. From these households, 100 households involved in the communal farming system were selected using the purposive non-probability sampling method.

4.6. Sampling

It is not always possible to use the entire population when conducting research. This may either be time-consuming or costly (Taherdoost, 2016). Therefore, a researcher selects a sample from the population to get insight into the population. A sample is a portion of subjects chosen by a researcher from a larger population by using a pre-defined selection method (Vasileiou et al., 2018). Two main types of sampling techniques are used in research: probability sampling and non-probability sampling (Acharya et al., 2013).

Probability sampling is a method that derives a sample by selecting objects from a population through probability theory (Taherdoost, 2016). In probability sampling method, the whole population is considered, and everyone can be selected for the enquiry. In contrast, under the non-probability sampling method, the researcher uses their discretion to select a sample (Marshall, 1996). Non-probability sampling techniques are often used in exploratory and qualitative research to establish an understanding of a specific population that is perceived to be under-researched

(Taherdoost, 2016; Acharya et al., 2013). Non-probability sampling has four techniques discussed below in the next section.

4.6.1 Convenience sampling

The convenience sampling technique allows an investigator to choose individuals or objects that are most accessible (Taherdoost, 2016). Though this technique is easy and cost-effective, it is difficult to tell if the sample is representative of the population. Hence, the results cannot be generalised. This study needs to produce results that can be generalised to other communal farmers in the North West province, with the same vulnerabilities to drought as the study area.

4.6.2 Snowball sampling

Researchers who opt for this technique often do so if the population is hard to access. Participants are used to recruit other participants until an acceptable or required sample is reached (Naderifar, Goli, and Ghaljaie, 2017). The disadvantage of this method is that it is often difficult to determine the sampling error or make inferences about populations based on the obtained sample. Snowballing will not be adopted in this study, mainly because of the current COVID-19 situation whereby restrictions on movements have to be adhered to curb the spread of the virus. The recruitment of participants will not be feasible; hence, this study adopted households/ communal farmer's individual questionnaires.

4.6.3 Quota sampling

Researchers create a sample involving individuals who share specific traits or qualities to represent a population (Ames, Glenton and Lewin, 2019). It consists of a two-step process where two variables can filter information from the population (Business Research Methodology, 2019). It can be administered easily and helps in making quick comparisons (Business Research Methodology, 2019). This sampling method is less expensive but not reliable as it carries a higher risk of bias than other techniques.

4.6.4 Purposive sampling

The objects or individuals selected for this type of sampling, also known as judgment sampling, is based on the purpose of the research according to the researcher's expertise (Etikan, 2016). Researchers often use this technique to understand a

specific phenomenon rather than make statistical inferences, or where the population is very small and specific (Naderifar, Goli and Ghaljaie, 2017). This study adopted a non-probability purposive sampling method to select 100 communal farmers resident in Borakalalo village. This method was chosen because the researcher wanted people who only fit the study's research criteria and objectives (Acharya et al., 2013).

4.6.5 Sample size

According to the literature, there is no formula for setting the sample size for purposive sampling. Instead, judgments must be made based on the expected heterogeneity of areas, population groups, locations, households, and individuals (WFP, 2007). Tabane (2016) argues that a sample size must be large enough to answer the research question. Similarly, Etikan (2016) asserts that a sample must be adequate for a researcher to generalise using a random sample and avoid sampling errors or biases.

Marshall (1996) and Vasileiou et al. (2018) assert that in purposive sampling methods, data saturation is very crucial. This implies that sampling must continue to a point where a comprehensive understanding is obtained, and no new substantive information is acquired (Vasileiou et al., 2018; Etikan, 2016). In support of this argument, Guba and Lincoln (1994) suggested that the size of a sample must be guided by informational redundancy, meaning that when there is no new information being elicited by sampling more units, sampling can be terminated. The total number of farmers sampled in Borakalalo was thus one hundred (100).

4.7 Data collection

According to Kothari (2004), data collection is the most crucial part of the research. Primary and secondary data was collected and analysed. Primary data was collected through questionnaires, observations and focus groups, while secondary data was obtained from various sources such as published data sources. Data sources were carefully analysed to ensure relevance to the study (Kothari, 2004).

4.7.1 Primary data collection

4.7.1.1 Interviews

Gill et al. (2008) outlined three types of interviews used in research studies. Structured interview involves questionnaires that are administered verbally where an interviewer asks questions following a clearly defined scope (Gill et al., 2008). This

type of interview offers little or no opportunity for follow-up questions. Second, semi-structured interviews only have a list of key questions to guide the interviewer on important concepts. It allows for divergence and follow up questions (Stuckey, 2013). Third, unstructured interviews are not structured at all. Interviewers ask questions based on the responses (Fox and Mathers, 2000). This study collected primary data using a community questionnaire survey approved by the University of the Free State Human ethics committee (UFS-HSD2020/1721/3011/21).

4.7.1.2 Observation

Observation is a data collection tool used in qualitative study where data is collected by observing the behaviour of participants in a natural set-up (Bouchrika, 2020; CDC, 2008). In this study, the researcher used the observation method as one of the tools for gathering primary information and data during the research. While the main data collection tool used was a questionnaire, observation helped the researcher to study the participants' behaviour and body language in order to test their reliability. In addition, the researcher was able to observe the situation on the ground to assess the features of the environment that may render the community vulnerable to drought.

4.7.1.3 Questionnaire

According to Hennink, Hutter and Bailey (2020), questionnaires are the primary tool for collecting primary information in qualitative research. Questionnaires enable the researcher to plan the questions properly and decide on the required sample (Sileyew, 2019). In this study, the researcher used the questionnaire as the primary tool to collect data. The questionnaire consisted of 26 questions, excluding follow-up questions. The questionnaire was divided into five parts. The first part focused on demographic information, which sought to gain background understanding regarding the farmers' resident in Borakalalo. This information was used to assess the socio-economic characteristics of participants and how this can influence their vulnerability and coping capacity to drought.

The second part of the questionnaire focused on communal farming. This part sought to understand the communal farming system dynamics and how farmers operating under this setup are exposed to drought. Furthermore, this part sought to establish how access to or lack of access to resources influences vulnerability and

coping capacity to drought. The third part was about drought impact and government interventions. The objective of this section was to establish how government supports affected farmers and how support is distributed. This information assists in deducing whether government's relief efforts are structured to build resilience or perpetuate vulnerability.

The fourth part of the questionnaire focused on drought-specific questions, which sought to understand whether early warning systems are in place and whether farmers heed the warnings. It further sought to establish whether awareness campaigns are carried out and how receptive, farmers' are towards early warning information and awareness. The last part of the questionnaire focused on vulnerability and drought coping strategies. The purpose of this section was to determine whether farmers are aware of their vulnerability to drought and what they are doing to cope with the adverse impacts of drought.

4.7.2 Secondary data collection

Secondary data refers to existing data that was not collected by the researcher (Sileyew, 2019). The sources include a review of literature, archives, newspaper articles and statistical data (Hox and Boeije, 2005). Secondary data allows the researcher to identify the gaps that exist around the subject (Sileyew, 2019). An extensive literature review was conducted to identify relevant concepts, methods and gaps in the current literature for this study.

4.8 Pre-testing of the data collection tools

Pre-testing the data collection tools can help researchers determine the strengths and weaknesses regarding the format of the questions, wording and order (Colorado State University, 2019). In addition, pretesting helps with the validity and reliability of the study in general as it allows researchers to identify questions that do not make sense or are confusing (Rothgeb, Willis and Forsyth, 2007). The researcher pre-tested the questionnaires to ensure that the tool content is valid and understandable. This was done with the first ten respondents, following which minor changes were effected on the questionnaire after pre-testing. Therefore, the questionnaire did not have to undergo the ethics approval process again.

4.9 Data analysis

Data analysis is the process of methodically applying statistical and/or logical techniques to describe and demonstrate, summarise, edit and evaluate data (Nassaji, 2015). In addition, Business Research Methodology (2019) reported that data analysis is the process of gathering, modelling and analysing data to extract information that supports decision-making. The data collected for this study was captured in Microsoft Excel software for cleaning and coding before being imported into Statistical Package for Social Scientists (SPSS) software for statistical analysis.

This study adopted descriptive statistics and inferential statistical tests (Chi-Squared test of independence) to accommodate the qualitative and quantitative nature of the research. The chi-squared test was applied to assess the relationship between farmers' responses for variables that are interlinked. The variables were cross tabulated, and clustered bar charts were produced for every cross-tabulation done. Descriptive statistics for this study included describing the results using the number and percentages of farmers' responses, complemented by pie charts, bar charts and tables of results to visualize the results. For the chi-squared results, the probability value was set as $P \leq 0.05$. All statistical tests were run on SPSS statistical software, and all the graphs were produced using the chart builder function of the SPSS software. Tables showing the results were produced using Microsoft Excel and imported into Microsoft Word.

4.10 Reliability and validity

Reliability and validity are concepts used in research to evaluate the credibility of research data (Price and Jhangiani, 2019). The reliability test evaluates the consistency of the measure, while validity evaluates the accuracy of the measure. The data collected from primary sources must be consistent with the literature if it is reliable and accurate (Oshagbemi, 2017). As such, the researcher compared observations to establish consistency. According to Price and Jhangiani (2019), people's responses must be consistent and correlated for correlation questions, and similarly, observations of the same situation must be consistent. For this study, the researcher used a questionnaire and observation to collect data. Pre-testing method was done to ensure the reliability and dependability of the data collected. In addition, the results were triangulated with similar studies available through a literature review.

4.11 Ethical considerations

The researcher obtained ethical clearance as required by the University of Free State Human Research ethics. The researcher ensured that respondents participated based on written informed consent in line with the University's ethics policy. The respondents were advised about the purpose of the research before any data could be collected from them. The respondents participated voluntarily and were informed of their rights to privacy and that their responses and identity would be kept confidential (Leedy & Ormrod, 2001; Mouton, 2001).

4.12 Summary

This chapter discussed and justified the research methodology employed by the researcher to answer the research question. The population, sampling and sample size were discussed. Furthermore, data collection instruments and procedures were also discussed together with ethical considerations, validity and reliability.

CHAPTER 5: DATA ANALYSIS AND RESULTS

5.1 Introduction

This chapter reports on the results of the 100 questionnaires administered to communal farmers resident in Borakalalo village in the North West Province of South Africa, analysed using Statistical Package for Social Sciences (SPSS) statistical software, as mentioned in the data analysis section above. To accommodate the mixed-method research approach adopted by this study, the chi-squared test of independence was used to test the relationship between variables (Scibilia, 2015). Qualitative data in this study is presented using descriptive statistics and visualized using bar charts and pie charts (Burnard et al., 2008). All 100 questionnaires were used in the analysis of the data.

5.2 Demographic information of farmers

Demographic information was obtained from the respondents regarding gender, ethnic group, employment status, age, educational level and race. This information is crucial as it provides an overview background of the respondents.

5.2.1 Respondents' gender

The 100 respondents comprised of 79 males and 21 females. This implies that women are not as active in farming as men in the study area. It is evident that gender-based inequalities still limit women's agricultural activity. Government must attend to this issue by empowering women and girls in agriculture to promote the agenda of sustainable development goals. It is reported that women can be active players in fighting poverty and food insecurity (UN Women, 2015).

5.2.2 Respondents' ages

The five age categories the study requested the respondents to choose from ranged from 18 to over 61 years. Age is one of the determinants of vulnerability, as reported by Donner and Rodrígue (2011). In addition, Altieri (2001) said that older people might contribute to coping capacities in terms of their wealth of indigenous knowledge and experience. However, they are the most vulnerable in that they may not have the ability to apply such knowledge without assistance from younger and able people (Rafiey et al., 2016). The study needed to understand the age distribution of the communal farmers in Borakalalo community to assess vulnerability to drought as far as age is concerned. The results revealed most of the respondents

to be between the age group of 40 to 50 years. This age group is mature about life issues in general. Some people under this age group already have children and some grandchildren to whom they might want to transfer the communal farming skills. Over 40% of the respondents were 50 years and above. The detailed demographic results of the farmers are reported in Table 5.1 below.

Table 5.1: Age of Borakalalo communal farmers

Age	Frequency
18-28	4
29-39	19
40-50	34
51-61	21
Above 61	22

Source: Field Survey (2021)

5.2.3 Respondents' ethnicity

All the respondents (n=100) were of black ethnicity, marginalised in South African history due to apartheid laws (Suzman, 2009). They do not have resources such as land, and most of the black ethnic groups in South Africa depend on the government for interventions (DAFF, 2012; Muthelo, Owusu-Sekyere, and Ogundeji, 2019).

5.2.4 Respondents' employment status

The majority of the respondents (n= 71) indicated that they were unemployed. Some of the respondents worked on the farm; however, they still reported being unemployed, probably because it is a family farm; therefore, they do not consider it as employment or because it does not generate income for them like formal employment will do.

5.2.5 Respondents' education level

The education status of the respondents was categorised into five parameters; of the 100 respondents, 11 reported that they did not have any form of schooling. Twenty-one (21) respondents indicated they had primary school qualifications, 22 had secondary school, 33 had matric, and 13 had a post-matric qualification. Education status is essential as it gives the researcher an idea of how drought concepts and early warning messages are understood and interpreted among communities.

Muttarak and Lutz (2014) reported that educated individuals are better aware of the disaster risks and, are therefore, more likely to undertake disaster preparedness than those who are not educated. In addition, Butz et al. (2014) reported that people who have some form of education are more likely to contribute and adapt their behaviours to reduce vulnerability.

Table 5.2: Educational level of Borakalalo communal farmers

Education level	Frequency
No schooling	11
Primary schooling	21
Secondary schooling	22
Matric	33
Post-Matric	13

Source: Field Survey (2021)

5.3 Communal farming in the study area

This section consists of ten questions that focus on communal farming. The aim of this section was to establish how communal farming system is set up in the study area. This enabled the researcher to deduce farmers' level of vulnerability to drought. The type of questions asked in this section was used to determine the level of exposure to drought, as well as the sensitivity of the farming system to drought.

5.3.1 Dependency on farming

The question of whether the respondents depend on farming for a living aimed to establish how vulnerable the livelihoods are to drought. The majority of farmers, 71%, reported that they depend on farming for their livelihood and subsistence, while 29% indicated that they rely on off-farm employment, as depicted in Figure 5.1 below. This implies that should drought persist in Borakalalo, many farmers, 71% of livelihoods, and subsistence will be affected, which might render these farmers at risk of food security. According to the World Bank (2020), agriculture helps improve food security for 80% of poor rural communities who depend on farming across the world (The World Bank, 2020). As such, it is crucial to strengthen the capacity of farmers to cope with drought so that they do not lose their livelihood. According to IATP (2000), any sudden and profound changes that affect the farm sector can cause severe social and political instability in economically developing countries such as South Africa.

Furthermore, the study applied a series of the Chi-square test (χ^2) of independence to evaluate the relationship between farmers' responses to the questions do you practice farming in your household, do you depend on agriculture for your livelihood? In addition, do you have off-farm employment? The Chi-square tests results showed a high statistically significant difference in response to these questions, with P-values <0.001.

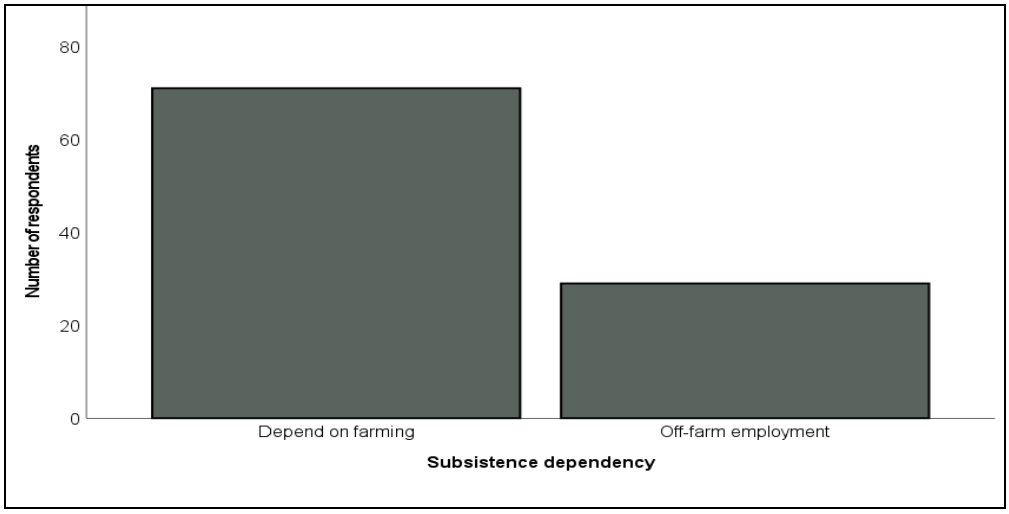

Figure 5.1: Respondents' dependency on farming
Source: Field Survey (2021)

5.3.2 Farm income

The farmers were asked if their farms generate any income. This question was asked to determine local economic vulnerability. It must be noted that this kind of farming system contributes to the local economy through its positive impact on food security. Of 100 respondents, 86% indicated that there was no income generated through farming; however, they slaughter to feed their families or do trade-offs. It has been reported that most farmers under communal set-up do not consider their farming system as any kind of business, as a result, they do not consider trade-offs made as income (Mmbengwa et al., 2017). Respondents further indicated that they use their livestock for traditional purposes such as slaughtering at funerals or during traditional ceremonies. Communal farming according to various studies is used as a form of subsistence in most parts of South Africa (Masiteng, Van Der Westhuizen and Matli, 2003; Mmbengwa, 2015; Raphela, 2019). Twelve percent (12%) indicated that they sometimes sell their livestock whenever they need money, which was considered income. Two percent (2%) indicated that they lost all their livestock due to drought (Figure 5.2).

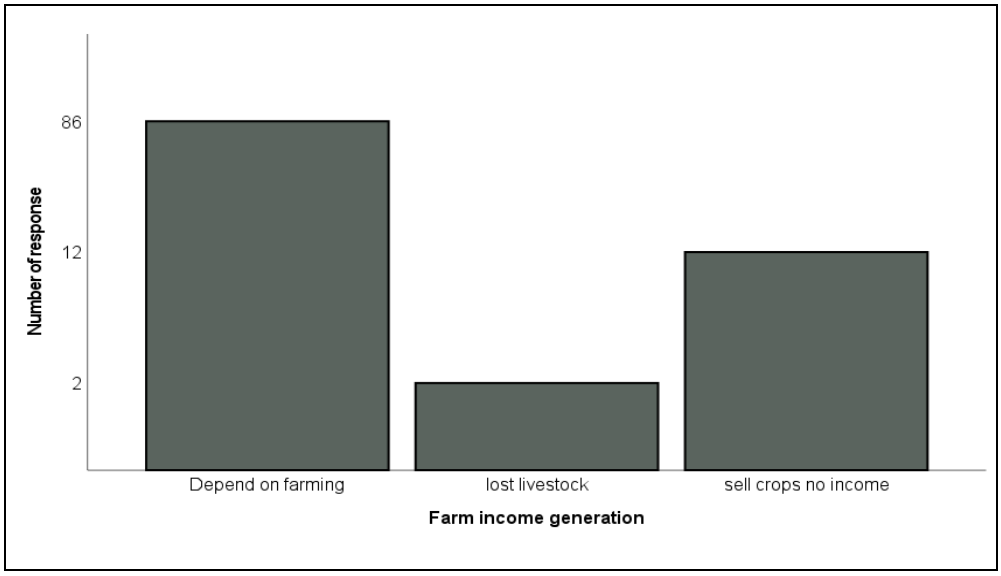

Figure 5.2: Farm income
Source: Field Survey (2021)

5.3.3 Ownership of land and type of farming practiced

The study established the type of farming practiced by farmers in relation to land ownership. This question aimed to establish whether resources such as land are available to farmers and what type of farming is being practiced. Lack of access to resources has been identified as one of the contributing factors to vulnerability. In addition, the type of farming practiced must be aligned to the topography of the area. Some cultivars thrive under certain conditions while others cannot.

Ninety-two percent (92%) of the respondents who were involved in livestock farming indicated that they do not own the land, 3% who were involved in mixed farming indicated they own the land they are planting on since, in most cases, it is their backyards. Only 2% practicing livestock farming stated that they owned the land they were using to farm. The remaining 3% of the respondents chose not to answer this question, as it was not applicable to them (Figure 5.3). In addition, a Chi-square test revealed a significant difference in responses when these two questions were cross-tabulated ($\chi^2 = 100.0$, df = 4 and P-value =0.04).

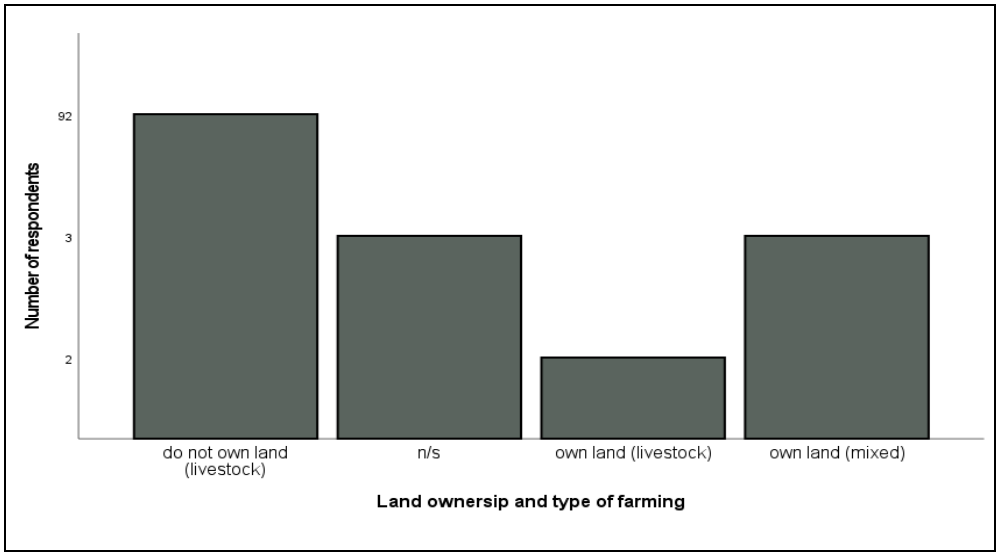

Figure 5.3: Type of farming versus land ownership
Source: Field Survey (2021)

5.3.4 Sharing of resources

The respondents were asked how many farmers share the land they are farming on. The majority, 94%, indicated that they share the land with the entire community since the land belongs to the tribal authority. Farmers who are farming in their backyards are sharing the land with their families. In addition, sharing of resources may increase vulnerability in that nobody takes responsibility of a shared resource. There is no direct ownership therefore management and the protection of such resource's are not assigned to a specific person. It is important to manage the number of people sharing resources, especially natural resources to manage exploitation and ensure accountability.

5.3.5 Type of commodities

Most respondents reported being livestock farmers, with the majority, 48%, reporting being cattle farmers whereas 43% reported farming a combination of cattle, sheep and goats. In addition, a small percentage of respondents 5% indicated that they are mixed farmers (crops and livestock); these farmers indicated they grow maize when the conditions are favourable. Two percent (2%) of the respondents keep small stocks such as goats and sheep while 2% could not respond to this question as they indicated that they lost their animals due to drought; therefore, they were are no longer involved in farming.

Table 5.3: Types of farming respondents practice in Borakalalo village

Parameters	Categories	Number of Respondents
Livestock farmers	Cattle	48
	Goats/sheep	2
Mixed farmers	Cattle/goats/sheep	43
	Cattle/sheep/goats/maize	5
Not applicable	None	2
Total		100

Source: Field Survey (2021)

5.3.6 Reduction of cultivated land

The respondents were asked to indicate the size of land used for farming. This question was asked to establish whether they have had to reduce the area planted due to drought. This question applied to farmers who said they are doing crop farming, meaning only 5% of the farmers hence 95% said they practice livestock farming. It was found that crop farmers are using their backyards; hence, most responses fell under the size of the land categorised as 1-5ha. Three percent (3%) of the respondents reported that they reduced the size of the area planted, while 2% indicated that they did not. Instead, they opt not to plant at all when the conditions are not favourable for crops. This indicates the effect of drought on both crops and livestock.

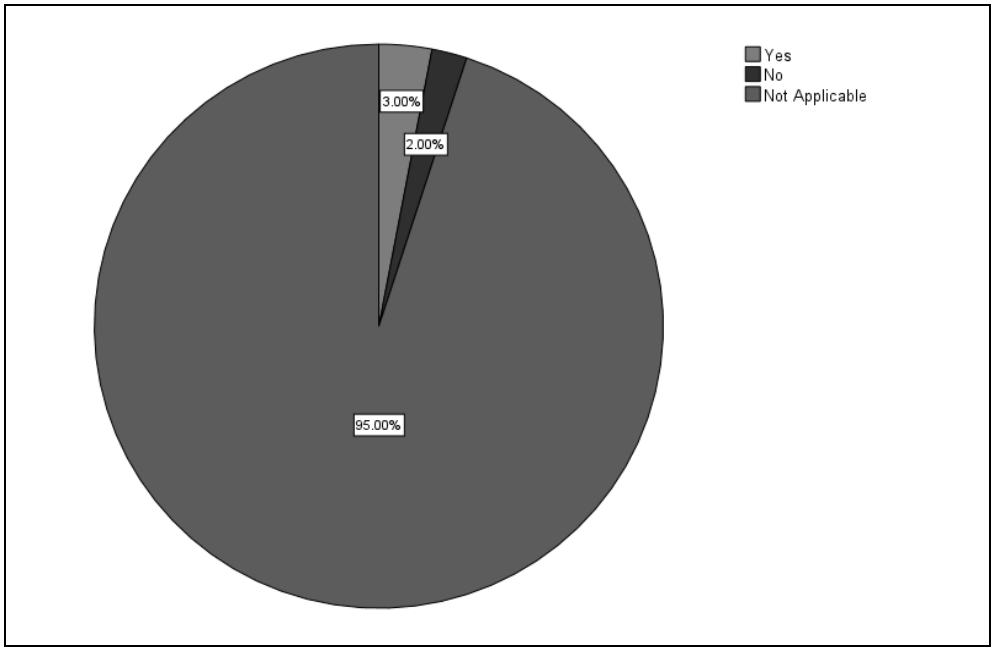

Figure 5.4: Reduction of land planted
Source: Field Survey (2021)

5.4 Drought impact and government interventions

This section aimed to determine the impacts of drought and government interventions.

5.4.1 Access to water

The respondents were asked whether they had access to water and the distance travelled to fetch water when they reported not having water in their yards. These two questions were asked to determine the accessibility of water in Borakalalo. The majority of the respondents did not have access to water; they had to travel a certain distance to harvest water for their farming activities, i.e., to water their crops and for their animals to drink.

Most respondents indicated that they fetch water from far; others indicated that they even have to fetch water from neighbouring villages. Only 32% of the respondents indicated they had access to water within 5km, while 33% indicated they travelled between 5 and 10km to get water for their farming activities. These two categories were classified as having access to water. About 35% said they do not have access to water as they have to travel between 10 and 20km to fetch water; hence, this distance category was classified as not having access to water (Figure 5.5).

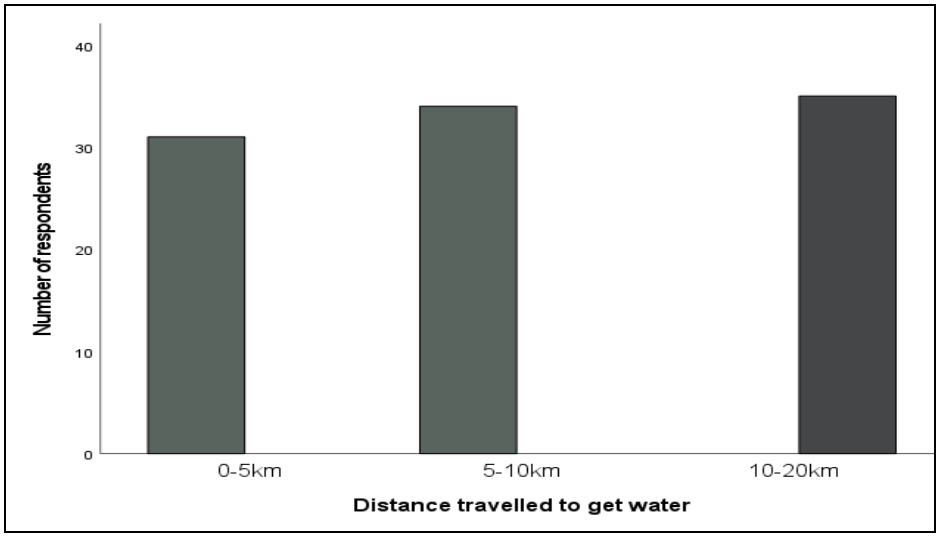

Figure 5.5: Distance travelled to fetch water
Source: Field Survey (2021)

5.4.2 Government assistance

The respondents were asked to indicate whether they have applied for government drought assistance. This question aimed to establish whether farmers apply for government assistance and whether government supports them. The majority of the respondents, 89%, said yes, whereas 11% said no, they never applied (Figure 5.6).

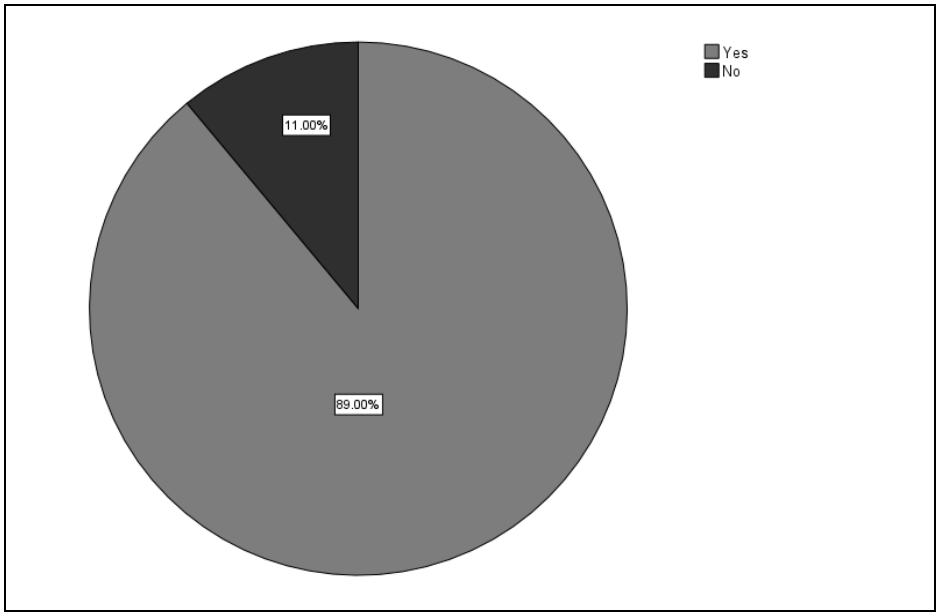

Figure 5.6: Whether farmers applied for government drought assistance
Source: Field Survey (2021)

5.4.3 Government assistance received

The respondents were further asked whether they ever received any support from government. This question applied to the farmers who indicated that they have applied for assistance, which is 89% of the respondents. Thirty-nine (39%) reported that they received some relief whereas fifty (50%) reported that they never received any help from the government (Figure 5.7). This question was not applicable to 11% of the respondents.

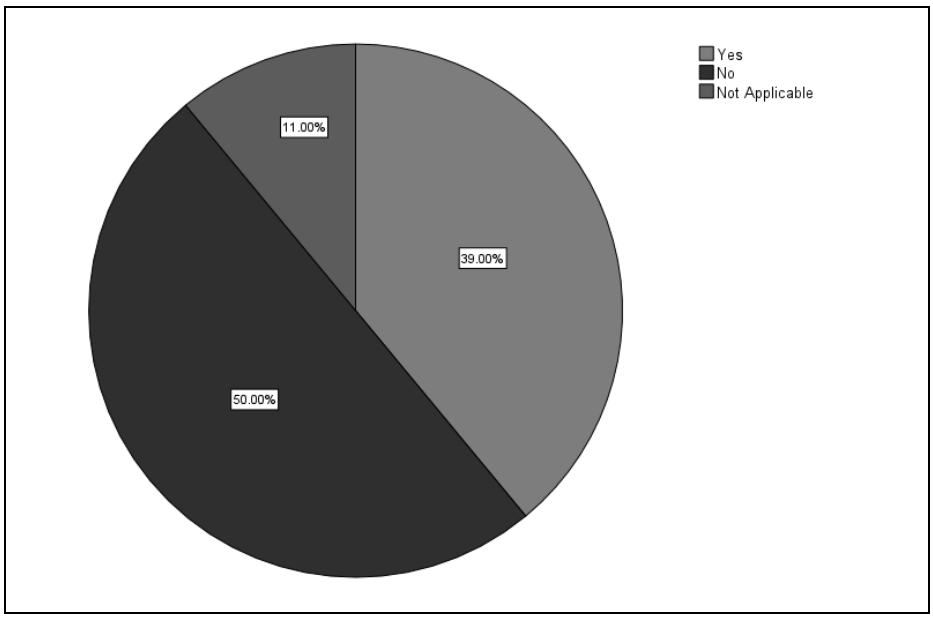

Figure 5.7: Government assistance received
Source: Field Survey (2021)

5.4.4 Type of assistance received from government

The respondents who indicated that they received some assistance from the government were asked what type of assistance they have received. They reported that the type of assistance received was fodder, livestock medicine, and water infrastructure. The number of respondents who said they were assisted with fodder was 34%, while 1% reported receiving water infrastructure and 4% livestock medication (Figure 5.8). This question did not apply to 50% who stated that they applied for assistance but never received anything as well as 11% who never applied.

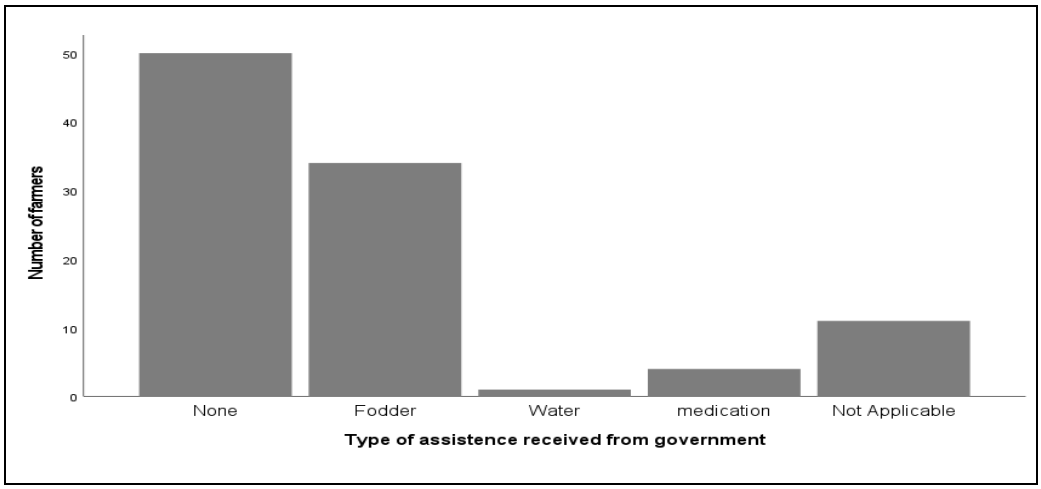

Figure 5.8: Type of government drought assistance
Source: Field Survey (2021)

5.4.5 Reason why assistance was never received

The respondents were asked to give the reason why they thought government never assisted them. This question applied only to farmers who reported they applied for assistance and never received any. This means 50% of the respondents were not eligible to respond to this question. Forty percent (40%), indicated that they did not know the reason, while 10% thought it was due to corruption in the government offices (Figure 5. 9). They stated that the government officials prioritise their families and friends and this response was categorised as corruption.

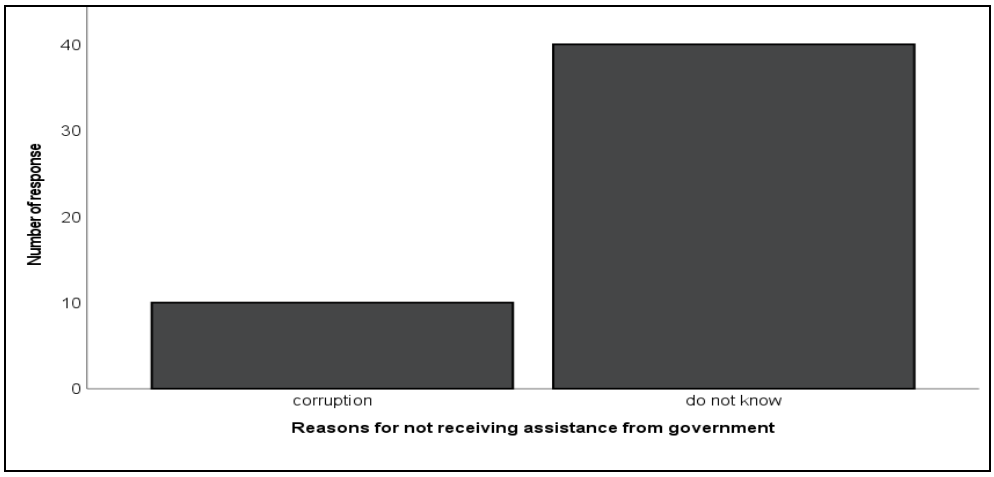

Figure 5.9: Reason why government drought assistance was not received
Source: Field Survey (2021)

5.5 Drought preparedness questions

The aim of this section was to assess the preparedness of the farmers to drought. It assessed the availability and effectiveness of an early warning system and public awareness. In addition, it established whether the farmers participate in government planning sessions.

5.5.1 Early warning received by farmers

The respondents were asked whether early warning information was received, and as a follow-up question, they were asked to indicate how they received their early warning information. The majority of the respondents, 88%, reported that they received early warning information, while 12% reported not receiving it.

5.5.2 The medium of communication for early warning information

Respondents were asked how they received the warning information. This question applied only to the farmers who said they received the early warning information, which was 88%. The majority, 75% reported that they received the information during information session days which are awareness sessions organised by the Department of Agriculture, while 5% reported they got the information through the radio stations, 7% said they received the information from community meetings. Only 1% reported that they got the information from one-on-one sessions with Extension officers (Figure 5.10). The responses to this question revealed a significant difference ($\chi^2 = 100.0$, df = 4, and P-value =0.000).

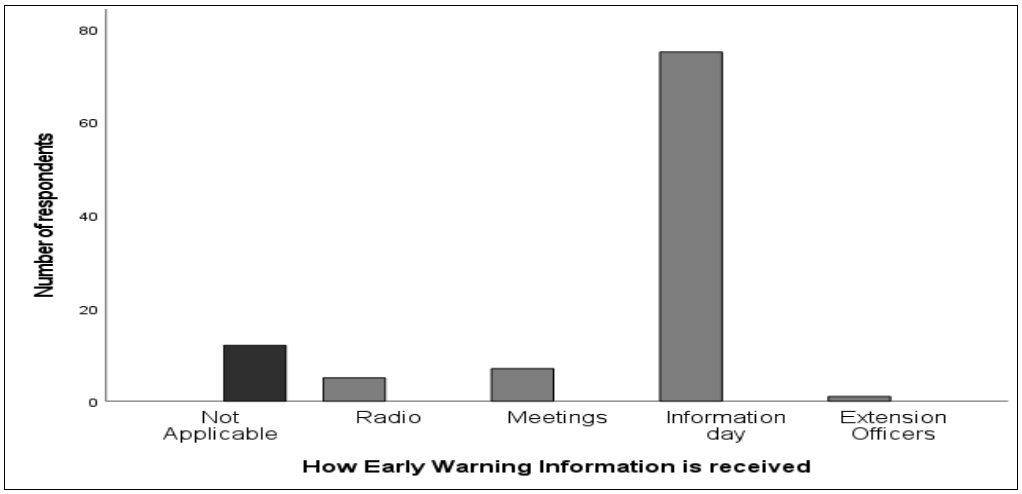

Figure 5.10: The medium of communicating early warning information
Source: Field Survey (2021)

5.5.3 The farmers' reaction to early warning information

The respondents were asked what they did when they received the early warning information. This question sought to establish if early warning messages are interpreted and acted upon accordingly. The majority of the respondents, 71%, said they used the information to protect their livestock by implementing some preparedness measures such as stock reduction; 17% said they did nothing with the information because of lack of resources. This question did not apply to 12% of the respondents.

5.5.4 Drought awareness conducted

The respondents were asked whether the government conducts drought awareness sessions. The majority, 87% said yes, 9% said no, while 4% said they do not know (Figure 5.11). Awareness is a method of capacity building that equips people with knowledge and information. People need to know and understand potential risks and how to protect themselves and their assets. It is imperative that public awareness campaigns are carried out.

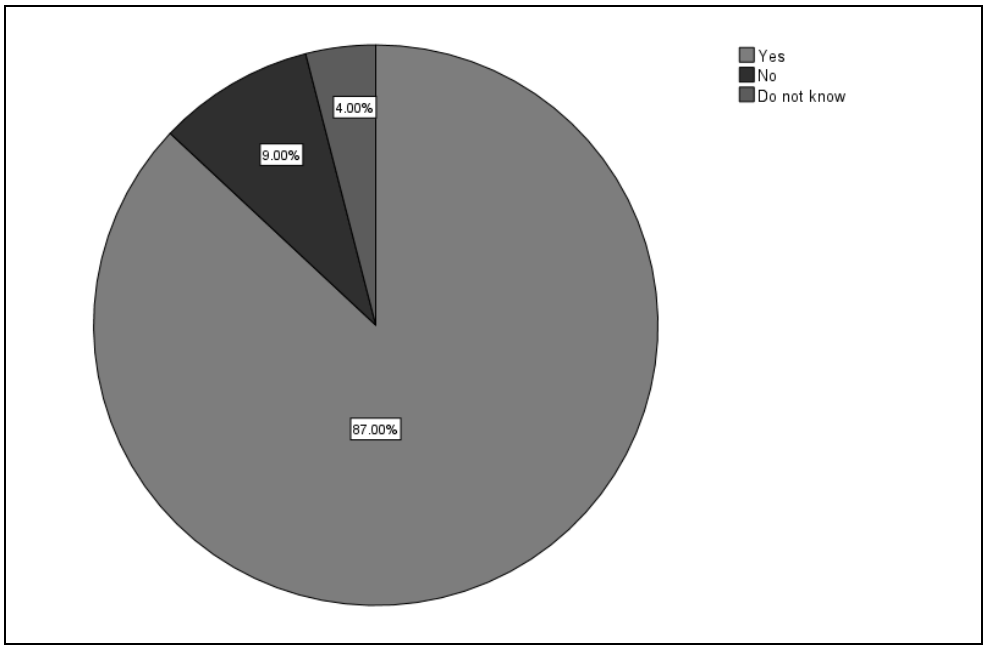

Figure 5.11: Government awareness sessions
Source: Field Survey (2021)

5.5.5 Farmers who attended awareness sessions

The respondents' farmers were asked whether they attended awareness campaigns. This question applied to 87% of the respondents who said they were aware of the awareness campaigns taking place. All respondents who said they were aware of

the awareness campaigns (87%), reported that they attended such sessions. The question did not apply to the remaining 13%, as they were unaware of the campaigns or they did not attend (Figure 5.12).

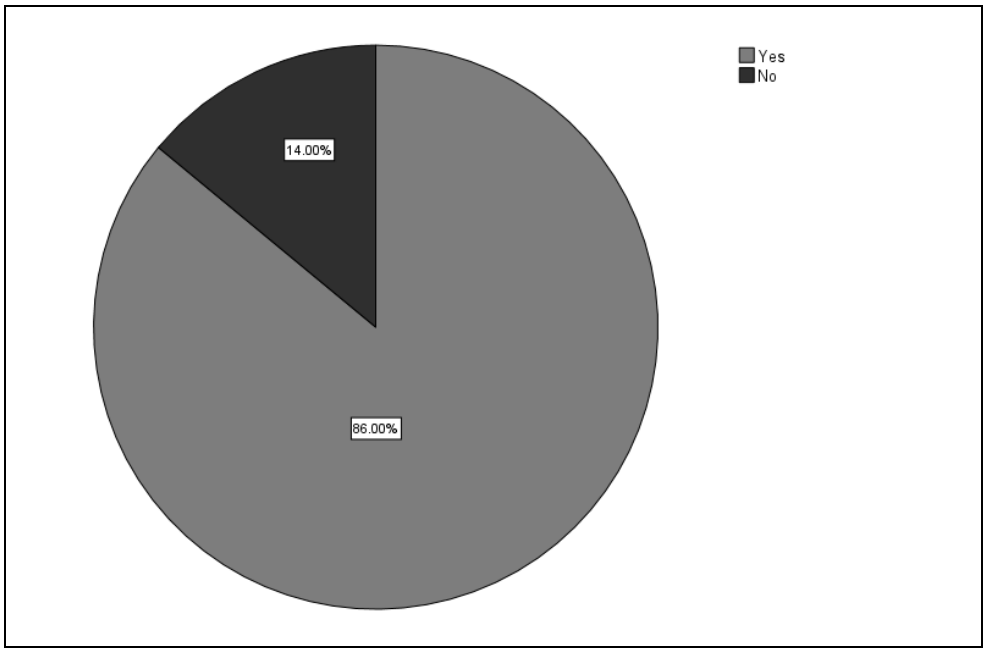

Figure 5.12: Farmers who attended awareness campaigns
Source: Field Survey (2021)

5.5.6 Participation in drought planning

The respondents were asked whether they took part in government planning sessions. This question aimed to establish whether government is inclusive in its approach when planning for drought. Literature shows that community-based planning can be beneficial as it encourages the community to take ownership of the plan. Furthermore, it gives government an opportunity to identify the needs of the community and customise its strategies accordingly. The majority of the respondents, 80% reported that they did not participate while 20% indicated they participated (Figure 5.13).

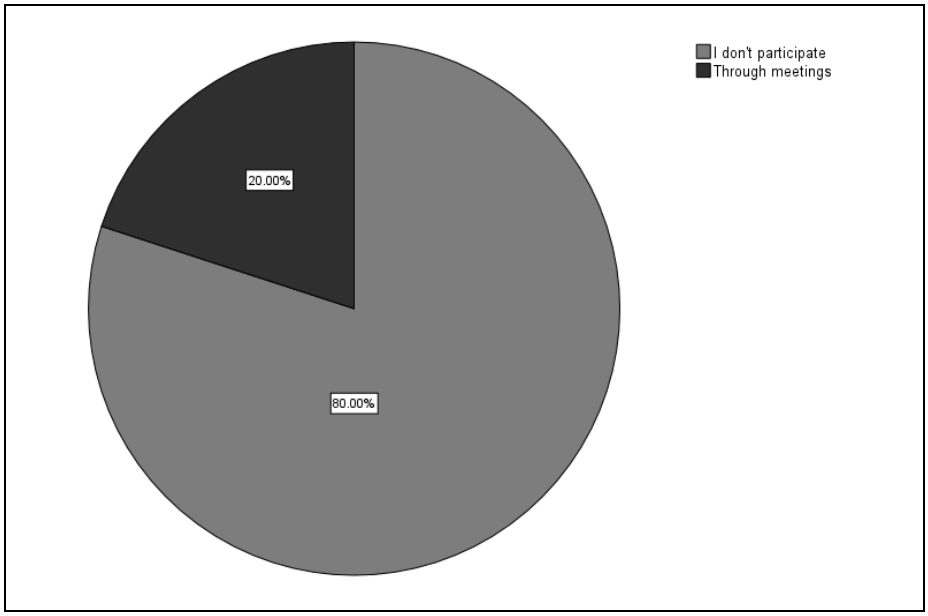

Figure 5.13: Participation in government planning sessions
Source: Field Survey (2021)

5.5.7 How farmers participate in government planning

The farmers were asked how they take part in government planning processes. This question sought to establish how easy it is to participate in planning processes. This question was asked to only 20% who reported that they participated in planning. These respondents reported that they participated in these processes by attending meetings. This suggests that the drought plans may not be inclusive of the majority of the farmers. The government needs to strengthen its capacity on a community-based approach to ensure that support offered to farmers is tailor-made to suit the needs of the affected population so that they gain interest and participate in the planning processes

5.6 Vulnerability and coping strategies to drought

This section aimed to determine three things: 1) whether farmers are aware of their exposure to drought, 2) whether they see drought as a problem and 3) whether they have coping strategies and whether they implement such strategies. This section gave the researcher an opportunity to assess vulnerability based on the strength of the coping capacity.

5.6.1 Farmers acknowledging drought as a problem

Respondents were asked whether they thought drought was a problem in their area, and all the respondents, 100% agreed that drought is a problem. All respondents were exposed and aware of the seriousness of drought in their area.

5.6.2 Farmers acknowledgment of their vulnerability to drought

Respondents were asked whether they felt they are vulnerable to drought, and all responded yes. This was based on the experience of respondents as they indicated that they have been experiencing drought for almost a decade. This indicated that the farmers are indeed vulnerable to drought and are aware of their vulnerability.

5.6.3 Farmers drought coping strategies

Respondents were asked whether they have any drought coping strategies. The majority, 90%, said yes, 7% said no, 2% said maybe, and 1% said that they do not know (Figure 5.14).

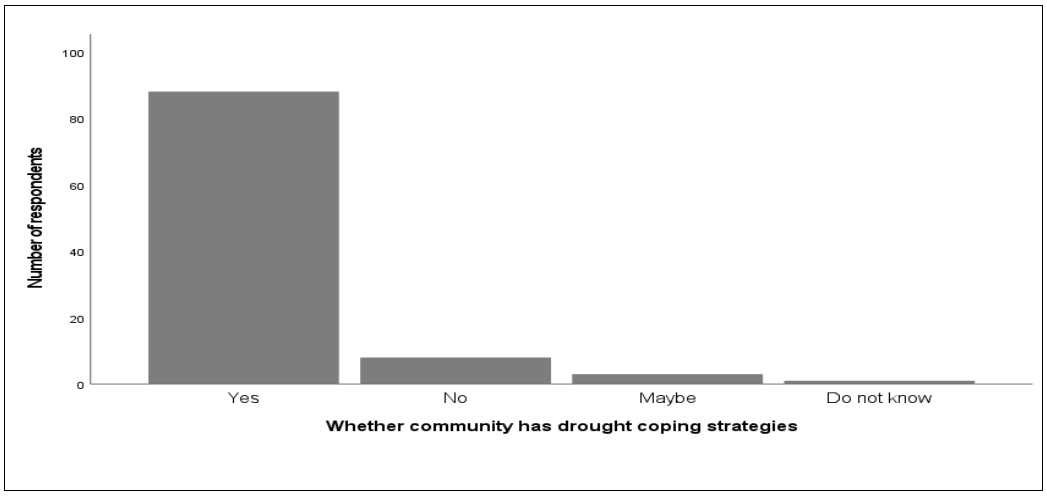

Figure 5.14: Farmers drought coping strategies
Source: Field Survey (2021)

5.6.4 Types of coping strategies employed by farmers

Respondents were asked to list the coping strategies that they implement. This question applied to only 90% that reported that they implement coping strategies because 10% had already indicated that they do not have any coping mechanisms. The majority of the respondents reported buying feed 33%, followed by those who said boreholes 6%; those who reduced stock was 51% (Figure 5.15).

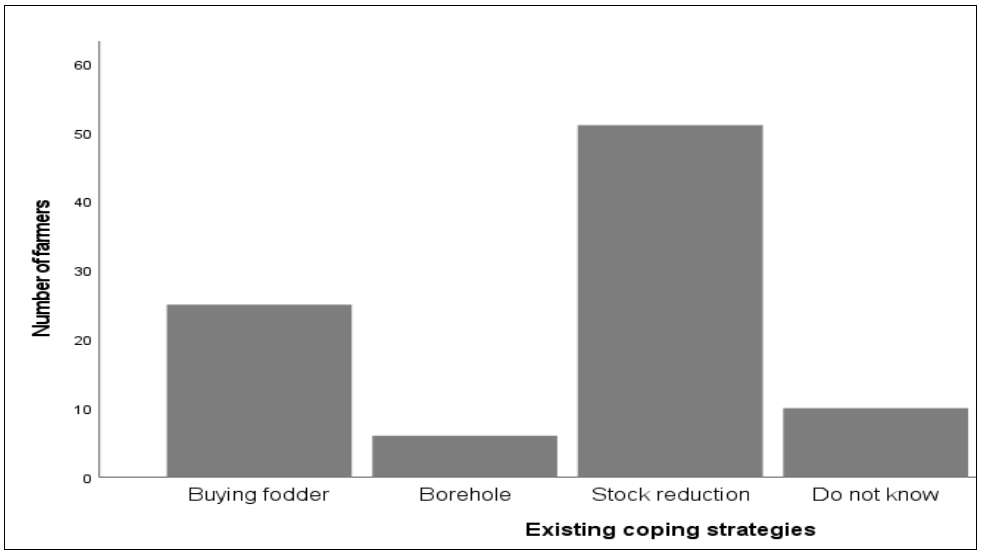

Figure 5.15: Coping strategies implemented by farmers
Source: Field Survey (2021)

5.7 General discussion

Data was collected from 100 farmers comprising of 79 males and 21 females. This indicated that females in the study area were not actively involved in farming as their male counterparts. The data further showed that the majority of the farmers within the study area are unemployed and depend on farming as a form of livelihood. Although the majority indicated that their farms do not generate income, it is clear that farming is important in the study area as it contributes to food security and the economy. Borakalalo is a village that still upholds culture and customs, and as such, the locals believe in cattle herding. To them, cattle represents wealth and power; therefore, they do not consider farming a business; hence, the majority do not consider it income generating even though they farm livestock that can be sold to generate capital.

A small percentage of Borakalalo communal farmers do not have any form of education, mainly, in the category of those who are over 60 years of age. In general, most farmers can read and understand since they have some form of education. This indicates that they can read or understand the information they receive regarding disasters. This information could be in the form of awareness or early

warning messages. The main question then becomes whether early warning information is being disseminated or whether awareness campaigns are done properly. Most of the respondents indicated that they do receive early warning information. At the same time, some acknowledged that awareness campaigns are done through extension officers, information days, community meetings and even radio stations. However, the challenge is implementing preparedness measures, as they do not have resources. The respondents said they attend meetings when called, but most stated that they are not involved in government planning processes.

The majority of the respondents reported that they did not receive any assistance from the government even though they applied. A small number of farmers also seem to have lost hope in government, as they have not applied for government drought relief; even though they know that it exists. The majority of the farmers reported corruption as one of the reasons they thought they were not receiving assistance from the government. This finding indicates a lack of confidence of Borakalalo communal farmers in their government. The data further indicates that farmers are aware of their vulnerability to drought and consider some measures to counter drought. Such measures included buying fodder for their livestock, reducing the number of animals and drilling boreholes. These findings show some level of awareness from the farmers when it comes to drought as a hazard.

5.8 Summary of findings

This study set out to:

5.8.1 Determine the level of drought disaster risks and vulnerabilities among communal farmers in Borakalalo village

This study found that all respondents agreed that drought is a problem in their communities and their farms. All respondents have been exposed and are aware of the seriousness of drought in their area. In addition, all respondents thought they were vulnerable to drought; this was based on the experience of farmers as they indicated that they have been suffering from the effects of drought for almost a decade. This study finding is significant in that the main research question sought to address the level of drought vulnerability and coping capacity for communal farmers in Borakalalo. The finding that all respondents think that they are vulnerable to drought needs serious government intervention.

Recurring droughts and their magnitude across the world indicate the growing vulnerability of the countries to drought (Gold, 1978). Drought management in many developing countries is mainly reactive, with government paying minimal attention to risk reduction. Therefore, the North West provincial government where the study area is situated should revise its drought plan to emphasise mitigation to reduce vulnerabilities of these farmers. To successfully develop and implement drought mitigation plans, governments need to undertake an assessment to establish the level of vulnerability as well as who is vulnerable. To manage drought disaster risks and vulnerabilities in the Borakalalo community, drought assessment needs to be carried out.

5.8.2 Determine the strategies implemented by communal farmers to cope with drought at the farm level

The study found that farmers are aware that they are vulnerable to drought and have put some measures in place. However, the coping strategies employed are also limited (Muthelo, Owusu-Sekyere, and Ogundeji, 2019). Farmers pointed out the most applied strategies in the study area. The coping strategies included stock reduction, buying fodder and drilling boreholes. The majority of the farmers reported stock reduction. This is a severe problem as reducing stock could render these farmers vulnerable to food insecurity should livestock diseases such as foot and mouth resurface.

Farmers are often forced to sell their livestock to buy fodder; this on its own is a risk to food security. In addition, livestock could be reduced by mortality because of drought. Many respondents did not report the drilling of boreholes, although the majority indicated that they do not have access to water or fetch water from far. The review of literature revealed many drought coping strategies that farmers can adopt to deal with vulnerability. Drought is a primary concern for South African agriculture, especially for resource-poor farmers such as the farmers in Borakalalo. South Africa recorded the worst hydrological drought in 2015-16 since the early 1980s (Bahta, 2020). This calls for more focus to empower farmers with coping capacity by sharing more knowledge through education and training and access to resources. Muthelo, Owusu-Sekyere, and Ogundeji (2019) state that insufficient knowledge and low levels of resources or livelihood assets available to farmers in vulnerable situations is the main limitation of coping and adaptation choices considered by farmers. To

enhance the coping capacity of the farmers in Borakalalo, the government needs to invest in capacity building by making resources available and accessible, as well as training and education.

5.8.3 Determine how government policies and strategies take the needs of communal farmers into account

Most respondents indicated that they do not have access to water; however, government assistance is more focused on providing fodder. One of the local chiefs suggested that their main concern is bush encroachment, which takes up the space for grazing. This, according to the locals, was one of the examples of the needs that the government is not heeding. The government must ensure that the farming community is part of the planning process. In addition, the respondents have ideas that can contribute positively to the plans and strategies if allowed to participate. According to Bahta (2020), locals have a wealth of indigenous knowledge that can be used with scientific research to build a resilient society. Furthermore, Muthelo, Owusu-Sekyere, and Ogundeji (2019) state that putting vulnerable people at the center of communication for adaptation is an integral part of the solution to the drought problem.

5.8.4 Determine whether the government is inclusive when developing plans and strategies for communal farmers

The majority of respondents indicated that they do not participate in government planning processes about drought. This suggests that drought plans may not be inclusive of the majority of the farmers. The government needs to strengthen its capacity on a community-based approach to ensure that support offered to farmers is tailor-made to suit the needs of the affected population so that they gain interest and participate in the planning processes. A sound disaster management plan should consider the conditions of the local community, including its social, cultural, economic, political and environmental characteristics (Allen, 2006).

5.9 Chapter summary

The results from the data collected for the study highlights that a high level of vulnerability exists within the study area. Interestingly, farmers are aware of their vulnerability to drought and acknowledge that it is indeed a problem. However, farmers rely mainly on only three measures: borehole, fodder and stock reduction as

coping mechanisms. Farmers are willing to sell their livestock to buy feed to maintain nucleus stock.

Lack of access to water was a serious concern raised by many farmers. However, water-saving strategies such as rainwater harvesting were not mentioned. The most important and effective measures of conservation of natural resources were not mentioned. Government has a lot of work to do in changing the mindset of farmers to be more conservative in dealing with drought. There is a lot that farmers could do to manage drought by being conservative to natural resources.

Drought is a global problem affecting an estimated 1.5 billion people, particularly those that rely on agriculture and other livelihoods sensitive to climate (IUCN, 2019). Therefore, drought policies and interventions should focus on nature-based solutions such as conserving and restoring ecosystems (IUCN, 2019). In addition, communities must be involved in the planning processes to ensure that they own the plan and implement it. Community participation is required to develop policies and strategies that are relevant, feasible and equitable at the local level (UN/ISDR, 2007). Drought policies and plans should be proactive by emphasising mitigation and preparedness rather than reactive crisis management.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the findings of the study and recommends possible measures to address these findings. Furthermore, this chapter outlines recommendations for future research based on the gaps identified in the study. Lastly, conclusions will be drawn based on the objectives and the findings of the study.

6.2 Results based recommendations

This study made recommendations to the North West provincial government and the Department of Agriculture and recommendations from further studies based on the study findings highlighted in the next section.

6.2.1 North West provincial government

Drought is one of the significant challenges to food security in South Africa (Muthelo, Owusu-Sekyere, and Ogundeji, 2019). Borakalalo village, in the North West province, is no exception as all farmers indicated that they experienced drought. In addition, farmers indicated that their livelihood is vulnerable to drought. However, the government needs to pay more attention to the following issues.

6.2.1.1 Strengthening of the early warning system

The majority of the farmers indicated that they receive early warning information through farmers' day events. Early warning information needs to be shared regularly when there is an impending situation. Even though drought is a slow onset disaster, early warning disseminations must be consistent with fostering a trust relationship between the community and relevant stakeholders. Waiting for the event to take place to get the information might be insufficient. Therefore, this study recommends that the North West provincial government strengthen early warning systems to ensure that any information about looming disasters reaches the farmers in time.

6.2.1.2 Community participation

The study found that the majority of the farmers do not participate in government planning processes pertaining to drought. The National Disaster Management Framework (2005) asserts that the community is at the coalface of disaster. This implies that communities are the first responders during disasters; as a result, they can contribute immensely to disaster management planning and strategies. In

addition, communities are placed at the centre of the research process to ensure that local issues are addressed, and community empowerment and ownership takes place. Therefore, the study recommends that community participation must be strengthened to ensure that plans and strategies are inclusive of the needs of the farming community.

6.2.1.3 Needs assessment before providing drought relief

It is recommended that the government conduct needs assessments before relief measures are implemented to ensure that the needs of farmers are considered. This is to avoid situations where only feeds are provided instead of fodder and water, as this study has shown.

6.2.1.4 Capacity building and preparedness

Government must invest in capacitating farmers to enable them to prepare adequately for disasters, including drought. This study acknowledges that drought is a slow onset disaster, and the government can do little to prepare adequately for the drought. Still, situations like the feared day-zero in the Western Cape a few years ago should have given the government ample time to revise their drought preparedness plan and capacitate the farmers.

6.2.1.5 Access to water

The majority of farmers indicated that they do not have access to water, stating that they have to travel a long distance to fetch water. This is a significant challenge as farming depends heavily on natural resources such as water. It is recommended that the government should focus its support on water provision, especially for agricultural purposes. Water is essential for livestock, humans and crops.

6.2.1.6 Ownership of land

The majority of farmers indicated that they did not own land. Land used for farming activities belongs to the tribal authority and is shared by the whole farming community. As a result, it becomes difficult to manage such land to regulate grazing, water use and management of natural resources in general. It is therefore, recommended that government provides farming land for farmers.

6.2.2 Farming community

The farming community must implement disaster risk reduction strategies to minimise the adverse impacts of drought. Several drought management strategies can be employed to counter the effects of drought; however, farmers in Borakalalo village only pay attention to three strategies. There is a need for capacity building in this regard to ensure that farmers become resilient and self-sufficient. Farmers must participate in the planning sessions to ensure that their needs are included in government plans and strategies.

A study conducted by Salvioni, Henke and Vanni (2020) revealed that one of the effective methods to survive risks associated with farming is diversification. Diversification has been increasingly recognised as a rewarding farming strategy through which farmers can produce on-farm non-agricultural goods and services. Off-farm employment is also a form of diversifying income so that farmers still thrive in drought and other disaster situations (McNamara and Weiss, 2005).

6.2.3 Farmers' organisations

The study recommends that farmers' organisations should collaborate with the government to maximise drought management initiatives. This will foster collaboration between farmers and government and therefore promote inclusivity.

6.2.4 Municipal and provincial disaster management centres

It is recommended that the disaster management centres coordinate planning focusing on disaster risk reduction. In addition, the centres should initiate research studies that focus on reducing the ecological and economic impacts of drought as it will continue to pose a challenge for the farmers in the future (Vetter, 2009).

6.3 Further study recommendations

This study experienced some limitations and other researchers can still explore the shortcomings in future research. This study, therefore, recommends that the following issues can be explored further to address the gaps.

6.3.1 The analysis of the effectiveness of drought relief measures in the communal farming system

It was observed that government relief was not properly managed and implemented. While the measures provide short-term relief, they create dependency rather than promote resilience. Therefore, the research needs to assess its effectiveness and

explore other means that can be adapted to support the farmers and encourage self-sufficiency.

6.3.2 The analysis of the effectiveness of early warning systems and awareness

The research found an early warning system in place and that awareness programmes are implemented to some extent. However, there seems to be a gap in how the farmers receive, interpret and implement the messages. Although the farmers indicated that they do not have the resources to implement preparedness measures, the government can explore measures available for farmers to execute at a low cost at the farm level.

6.3.3 On- and off-farm diversification as a coping mechanism

The majority of the farmers are not employed and depend solely on farming for a living. This is a threat to food security and the economy as farming is a high-risk business in semi-arid areas such as the North West province. Farmers must explore other avenues available as a primary or secondary form of income to augment farming.

6.3.4 Gender mainstreaming in agricultural production

Although this study was not essentially about gender, it became apparent that women are not as actively involved in agriculture as men. Women play a pivotal role in food production; however, they are not able to own resources (MB, 2018). It would be interesting to understand how women can be included in government plans to ensure that they are active agents in curbing the food insecurity challenge.

6.3.5 The effects of water scarcity on the communal farming system

It was found that most farmers travel long distances to fetch water for their livestock. This finding opens up a future research study to explore how farmers cope with fetching water daily farming activities or at whatever interval that they fetch water.

6.4 Study conclusions

This study aimed to assess vulnerability and coping capacity to drought of communal farmers in Borakalalo village. The reality is that drought is considered a regular recurring event that affects people worldwide and is one of the most devastating natural disasters in economic, social and environmental terms (Jordaan, Bahta, and Phatudi-Mphahlele, 2019). As a result, communal farmers are more exposed to

drought, essentially because of their lack of resources (Fara, 2001). This study established the relationship between vulnerability and coping capacity, which is directly proportional. While the farmers are well aware of their vulnerability to drought and implement some measures to cope with drought, the study found that the coping strategies employed are limited. This implies that the extent to which vulnerability is being addressed is minimal. More focus must be put on education and awareness to enable farmers to adopt other coping strategies. Government must develop programmes that focus on investing in disaster risk reduction.

This study further revealed that the current government's approach to drought is reactive as it seemed as though there were no drought management plans before the drought. This resulted in the provision of resources without needs assessment being conducted, as found by this study. Collaboration must be fostered between the government, farmers, tribal authorities and farmers' organisations to ensure a coordinated approach to drought management.

The resource-poor farmers are the most affected by drought in South Africa. Drought vulnerability is very complex, yet it is essential to design drought preparedness and mitigation strategies and relief policies and programmes. It is also vital to assess the coping capacity to drought and aligning it with capacity-building programmes. This study sought further to contribute to the body of knowledge that exists and to assist decision-makers and planners in dealing effectively with drought. In addition, this study identified shortcomings in the existing drought management approaches that decision-makers emphasize.

The study found that farmers receive early warning information through various platforms, including radio, meetings, awareness campaigns, and one-on-one engagements with extension officers. The challenge, however, was the action taken by farmers upon receipt of such information. It was found that some farmers implement some preparedness measures, or at least know that they must implement preparedness; however, due to lack of resources, it becomes a challenge.

The findings show that government-planning processes are not inclusive of communal farmers in the study area. Farmers reported that they do not participate in disaster management planning activities. Such activities include disaster risk assessments, risk profiling, and providing inputs in response and relief efforts. This

process is crucial to ensure that the support to farmers is tailor-made and that it addresses farmers' needs. Community-based disaster preparedness plays a critical role in developing a community's adaptive capacity and resilience to disasters.

The findings further reported that coping strategies for the farming community of Borakalalo are limited. The farmers reported three methods. Ncube (2016) identified several techniques that can be adopted at the farm level to cope with drought harsh conditions, including rainwater harvesting and water storage, infrastructure maintenance, crop rotation, zero tillage, and pasture management, among many. Government and farmers' organisations should strengthen capacity building to empower the farmers. Furthermore, it was interesting to note that livestock reduction was frequently mentioned as a coping mechanism, with some farmers reporting that they sell their livestock to buy feed. However, some of the farmers reported livestock reduction because of drought-induced mortality.

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APPENDICES

APPENDIX A: ETHICAL CLEARANCE LETTER FROM THE GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

18-Jun-2021

Dear Mrs Nonjola, Oboneng OC

Amendment Approved

Research Project Title:
Reviewing vulnerability and coping capacity to drought: A case of Borakalalo communal farmers

Ethical Clearance number:
UFS-HSD2020/1721/3011/21

We are pleased to inform you that your amendment application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for notifying the ethics committee of the changes/amendments that have been made to your study; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

Adri du Plessis
Digitally signed by Adri du Plessis
Date: 2021.06.21 07:56:01 +02'00'

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Bloemfontein 9300
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APPENDIX B: RESEARCH STUDY INFORMATION LEAFLET AND CONSENT FORM

DATE

17 09 2020

TITLE OF THE RESEARCH PROJECT

Reviewing vulnerability and coping capacity to drought: a case study of Borakalalo communal farmers in North West province, South Africa

PRINCIPLE INVESTIGATOR / RESEARCHER(S) NAME(S) AND CONTACT NUMBER(S):

Ms Oboneng Cynthia Nonjola 0724838346

FACULTY AND DEPARTMENT:

Natural and Agricultural Sciences

Disaster Management Training and Education Centre for Africa

STUDYLEADER(S) NAME AND CONTACT NUMBER:

Dr Tlou Daisy Raphela (0865999)

Contact number 0721084987

WHAT IS THE AIM / PURPOSE OF THE STUDY?

To assess the vulnerability and coping capacity to drought among the communal farmers of Borakalalo

WHO IS DOING THE RESEARCH?

Oboneng Cynthia Nonjola, a student at the University of the Free State, registered for Masters in Disaster Management.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes

Approval number: UFS-HSD2020/1721/3011/21

WHY ARE YOU INVITED TO TAKE PART IN THIS RESEARCH PROJECT?

You are chosen to participate in this study to help the researcher to assess the vulnerability and coping capacity to drought in Borakalalo. You are chosen because you are a communal farmer in the area of Borakalalo.

WHAT IS THE NATURE OF PARTICIPATION IN THIS STUDY?

The researcher will ask you questions as they are captured in the questionnaire and you are expected to answer them with honesty. The questionnaire will take approximately 30 minutes to complete.

CAN THE PARTICIPANT WITHDRAW FROM THE STUDY?

Participation in this study is voluntary and there is no penalty or loss of benefit for non-participation. Being in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

This study findings will contribute to the available drought literature and also assist decision and policy makers to improve drought management plans to benefit communal farmers

WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?

You may need to take up approximately 30 minutes of your work time.

WILL WHAT I SAY BE KEPT CONFIDENTIAL?

Yes, and you will be responding under anonymity. Your name will not be recorded anywhere.

HOW WILL THE INFORMATION BE STORED AND ULTIMATELY DESTROYED?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet (at DiMTEC offices) for future research or academic purposes; any electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICPATING IN THIS STUDY?

Your participation is voluntary, and you will not bear any costs for participating in the study. There will be no payment or any incentive for participating in this study.

HOW WILL THE PARTICIPANT BE INFORMED OF THE FINDINGS / RESULTS OF THE STUDY?

If you would like to be informed of the final research findings, please contact Ms Oboneng Cynthia Nonjola on 0724838346 or email: Obonengt@gmail.gov.za. The findings are accessible from the date of publishing. Should you have concerns about the way in which the research has been conducted, you may contact: Amanda Smith, SmithAM@ufs.ac.za. Natural and Agricultural Science GHREC Administrator; 051 401 3942.

Thank you for taking time to read this information sheet and for participating in this study.

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read and understood the study as explained in the information sheet. I have had sufficient opportunity to ask questions and am prepared to participate in the study. I understand that my participation is voluntary and that I am free to withdraw at any time without penalty. I am aware that the findings of this study will be anonymously processed into a research report, journal publications and/or conference proceedings.

I agree to the recording of the questionnaire.

I have received a signed copy of the informed consent agreement.

Full Name of Participant: _____

Signature of Participant: _____
Date: _____

Full Name(s) of Researcher(s):
_____

Signature of Researcher: _____
Date: _____

APPENDIX C: QUESTIONNAIRE FOR THE PARTICIPANTS

Name of Researcher: Mrs Oboneng Nonjola

Contact details: Cell: 0724838346| Email: Obonengt@gmail.com

Masters Student: University of the Free State

I would like to invite you to take part in my research study by completing the below questionnaire.

Topic: "Reviewing vulnerability and coping capacity to drought: A case of Borakalalo communal farmers".

Please assist by responding to the questions with honesty, indicate your choice of response with a cross (an "X") and also make use of the spaces provided to respond to open-ended questions. The questionnaire consists of 21 main questions. The data collected will be kept strictly confidential and findings will be used for academic purposes only.

PART A: DEMOGRAPHIC INFORMATION

A.	**Gender**	Male				Female			
B.	**Ethnic group/race**	Black		White		Coloured		Indian	
C.	**Employed**	Yes				No			
D.	**Age**	18-28		29-39		40-50		51-61	Above 61
E.	**Educational Level**	No Schooling		Primary schooling		Secondary education		Matric	Post matric

PART B: COMMUNAL FARMING

1. Do you practice any farming in your household?

Yes	***No***

2. If you answered yes on 1 above, do you depend on farming for a living or do you have off-farm employment?

Employed	**Depend on farming**

If you answered yes on 2 above, does your farm generate any income/profit?

Yes	**No**

3. What type of farming are you involved in?

Crop	**livestock**	**Mixed**

4. Do you own the land you are farming on?

Yes	**No**

5. How many people are using or sharing this farm?

_____

6. How are people using this farm related?

Family		**Co-op**		**Friends**		**Community members**	

7. Based on your answer above, Please indicate What crops do you grow or what animals you farm or both?

Animals	Crops

8. In hectors/ square kilometers, how big is the cultivation land within your farm if you indicated to grow crops above?

_____

9. Have you experienced any reduction in land currently planted as a result of this drought?

Yes	**No**

10. Do you have access to water?

Yes	**No**

How far do you travel to get water (km's)?

0-5km	**5km-10km**	**10km-20km**	**More than 20km**

PART C: Drought impact and government Interventions

11. Have you applied for any farming-related assistance from the government?

Yes	**No**

12. If yes, have you ever received any farming assistance from the Government?

Yes	**No**

If yes, what type of assistance have you received?

_____
___

If not, state the reason why you have not received any government assistance?

_____
___

PART D: Drought related questions

13. Do you get drought early warning information?

Yes	***No***

If yes:

How?_____
___

14. What do you do when you receive the information?

_____
_____
_____
_____

15. Does the government conduct awareness sessions/information-sharing sessions in your area pertaining to drought impact?

Yes	**No**	**I do not know**

16. Do you attend drought information/awareness campaign sessions in your area?

Yes	**No**

17. How do you take part in government drought planning processes if any?

_____

_____

_____

_____

PART E: Vulnerability and coping strategies to drought

18. Do you think drought is a problem in your community and farm?

Yes	**No**

19. DO you think your community and your household are vulnerable to drought?

Yes	***No***

20. If you answered yes above, does your community and household have any coping strategies to the drought problem?

Yes	**No**	**Maybe**	**Do not know**

21. If you answered yes above, please name the drought coping startegies you or your community have implemented.

_

APPENDIX D: RESEARCH APPROVAL LETTER FROM EMPLOYER

Ms OC Nonjola
Room 209- Hamilton Street 110

APPROVAL TO CONDUCT RESEARCH STUDY

It is my pleasure to inform you that you have been granted permission to conduct research under the title: 'Reviewing vulnerability and coping capacity to drought: a case of Borakalalo communal farmers in North West province, South Africa" in order to obtain Masters in Disaster Management through the University of Free State.

I wish you all the best and hope that the outcomes of your study will be valuable in improving the planning for drought in the future.

Please contact Dr Ikalafeng Kgakatsi on 012 309 5722/3 or IkalafengK@dalrrd.gov.za/MittaA@dalrrd.gov.za should you wish to make any enquiries on this matter.

Yours sincerely,

p.p DIRECTOR GENERAL
Letter Signed by: Dr .I.B Kgakatsi
Designation: Director: Climate Change and Disaster Management
Date:

APPENDIX E: CONFIRMATION OF EDITING

O K M
LANGUAGE AND TECHNICAL EDITING • PROOFREADING • PLAGIARISM CHECKING • ACADEMIC RESEARCH (HONS AND MASTERS) AND PROJECT SUPERVISION • BUSINESS PROPOSAL

23 November 2021

LETTER OF CONFIRMATION

I hereby confirm that I have done the language editing for the following dissertation:

Author: Mrs O C Nonjola

Title: Reviewing vulnerability and drought coping capacity: A case study of Borakalalo communal farmers in North West province, South Africa

Document: Master in Disaster Management

This letter serves to confirm that I have edited Mrs O C Nonjola document and I have made appropriate changes and highlighted areas that the student needs to revisit. The document was edited using track changes and comments in Microsoft word.

I am not responsible for any additional information that is added to the document after I have edited it. The student is responsible for the final document submitted.

I trust you find the above in order.

Regards

H
Registered Board: South African Translators Institute
Membership Number :10033691

CELLPHONE: 072 748 4133 • WORK NUMBER: 051 436 2488 • E-MAIL: hmajonga@gmail.com • ADDRESS: 14 GROOTE SCHUUR, ALWAL STREET,ARBORETUM,BLOEMFONTEIN

APPENDIX F: PLIAGIARISM REPORT

plagiarism report OC Nonjola.pdf