Assessing the readiness and recovery efforts of communal farmers towards the 2018/19 agricultural drought: A case study of Outapi Constituency in Namibia

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Thesis submitted in fulfilment of the requirements for the degree of Master of Natural Resources Management (09MNRM) at the Namibia University of Science and Technology

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Declaration

I, Gerson Aileka, hereby declare that the work contained in the thesis entitled: Assessing the readiness and recovery efforts of communal farmers towards the 2018/19 agricultural drought: A case study of Outapi Constituency in Namibia is my own original work and that I have not previously in its entirety or in part submitted it at any university or higher education institution for the award of a degree.

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List of Acronyms

CIA	Central Intelligence Agency
DAPEES	Directorate of Agricultural Production, Extension and Engineering Services
DRMA	Disaster Risk Management Act
FAO	Food and Agriculture Organisation of the United Nations
GDP	Gross Domestic Product
GRN	Government of the Republic of Namibia
HMNDP	High Level Meeting on National Drought Policy
ITA	International Trade Administration
MAWF	Ministry of Agriculture, Water and Forestry
MAWLR	Ministry of Agriculture, Water and Land Reform
MLR	Ministry of Lands and Resettlement
MTC	Mobile Telecommunications Company
NAB	Namibia Agronomic Board
NUST	Namibia University of Science and Technology
NSA	Namibia Statistics Agency
NVRAC	Namibia's Vulnerability and Risk Assessment Committee
OPM	Office of the Prime Minister
SDGs	Sustainable Development Goals
SSDDCAs	Small Stock Distribution and Development Programme in Communal Areas
UNDP	United Nations Development Programme
WFP	World Food Programme
WHO	World Health Organisation

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Dedication

I wholeheartedly dedicate this thesis to my respective parents and siblings, my father (Johannes Aileka); my mother (Kristofina Nangundi); and my sisters (Veronika Aileka and Wilhelmina Aileka), who have at all times been my constant source of inspiration and support. I appreciate the constant motivation and discipline they endorsed for me to face this inspiring task. Hence, without their support, this particular project would not be a success. Thank you all for creating a conducive and enabling environment for me to see this inspiring task through to its end.

Abstract

This study aimed to assess the readiness of communal farmers in the Outapi Constituency in Namibia prior to the 2018/19 agricultural drought, response approaches employed to lessen drought impacts, and post-drought recovery strategies necessary for prospect preparation and recovery. Literature shows that better projection in disaster risk management is attainable if there is a timely and appropriate distribution of resources to support communal households while building resilience at the household level.

To address the research objectives, a mixed-method research design that employs both qualitative and quantitative methods was chosen. A structured questionnaire was administered face-to-face to the sampled communal households from five (5) villages in the Eengolo settlement. Sampling was performed on the data sets retrieved from the Namibia Communal Land Administration System (NCLAS) by means of clustering villages, and a random sample of 50% was drawn from each village. All five (5) villages have a combined population of 227 households. A total sample size of 112 households was therefore drawn. Out of the 112 households sampled, the researcher interviewed 104 households. A deficit of 8 households was recorded, mainly linked to households occupied by individuals less knowledgeable about the 2018/19 agricultural drought under review and refusals. Both primary quantitative and qualitative data were collected through the interviews with the sampled households. Key informants (Ministry of Agriculture, Water and Land Reform, Ministry of Works and Transport, Ministry of Health and Social Service, Omusati Regional Council, Office of the Prime Minister, Traditional Authority, village headmen, and other community leaders) were consulted, and qualitative data were collected. Both research approaches complemented each other, which permitted a complete analysis of the readiness, response, and recovery efforts towards the 2018/19 agricultural drought.

The study found that the 2018/19 agricultural drought was associated with negative impacts such as high crop failure, high livestock mortalities instigated by a lack of water, and poor grazing, which subsequently deteriorated households' livelihoods. Results show that 71% of households relied primarily on pensions, other social grants, and subsistence farming to sustain their livelihoods. The majority of communal households (90%) relied on livestock supplementary feeds, well-preserved crop remains, and rotational grazing systems as livestock drought preparation mechanisms to supply food for livestock. All measures were implemented using early warning information. Community early warning systems that convey early warning-related information on the likelihood of the drought to households are local media (radio and newspaper), community/traditional leaders, and the community meteorological station. Communal

households (44%) confirmed that the early warning information systems present in the community were reliable and trusted with drought readiness, response, and recovery. The majority of households (58%) selected drought-resistant crops (pearl millet and sorghum) that strive best in harsh conditions as a mechanism for drought preparation in the aspect of crops and vegetables because they thrive well in northern communal areas.

Communal households employed interventions to strengthen their coping capacities, with 78% primarily relying on existing food reserves. Conservation of soil and water management are key. The results show that 69% of households employed appropriate water management strategies. Concerning livestock management, 82% of households relied on livestock supplement fodder that was sourced privately and through emergency support by the government. Post-recovery measures employed by communal farmers were mainly to rebuild livestock herds, as specified by 72% of households, and 49% applied crop management practices. On the marketing of crops and vegetables, 99% of households cited that portions of crops and vegetables produced are for household consumption, while 80% stipulated that they do not market their crop produces. A mere 12% have access to the market, of which 10% have access to formal markets, while 2% trade on the informal market. Results on livestock marketing show that 76% of households do not market their livestock but prefer to keep them for household consumption (94%). A mere 15% have access to the market, of which 14% trade on the informal market, while 1% trade on the formal market.

In conclusion, the choice of drought readiness strategies, drought intervention strategies, and post-drought recovery strategies employed by communal households was assessed. The results clearly portray that communal households experienced negative drought impacts and employed appropriate mechanisms to prepare for the drought, employed interventions to cope with the drought, and employed post-drought recovery measures. Drought is known as a natural and climatic event that is inevitable, but the implementation of appropriate measures proved to be a better way of preparing communal households to cope with drought. Moreover, appropriate measures assist in creating an environment that is resilient, has the ability to recover from drought, and lessens the impacts of droughts.

Having presented key issues related to the drought readiness, response, and recovery efforts of communal farmers with implications, it is worthy to formulate recommendations focusing on policy strategy and supplementary sustainable strategies aimed at addressing identified implications.

A number of recommendations were formulated that will assist communal farmers and allied stakeholders in strengthening household drought coping capacity, institutional response, recovery, and building resilience. The study recommends the following: the Ministry of Agriculture, Water and Land Reform, the Namibia Agronomic Board, and Ministry of Industrialization and Trade, supplemented by efforts from the Constituency Councillor, should explore and create new market access and reinforcement of existing markets by communal farmers. This is vital because most communal households grow crops and vegetables and rear livestock mainly for household consumption, while others lack market access information. Communal farmers with large herds of livestock are highly advised to apply destocking, as this will assist in keeping a reasonable herd that is easier to manage with available resources during the drought. It is vital that coordination among institutions that are directly involved in the administration, coordination, and implementation of the National Disaster Management System in Namibia be strengthened.

This study recommends that there is an urgent need to establish sufficient water harvesting infrastructures with the aim of complementing GRN efforts in addressing access to water in the community. As part of legislation review, the Ministry of Agriculture, Water and Land Reform should finalise the review of the National Drought Policy and Strategy of 1997. Communal households should consider the creation of a fodder bank, either at an individual household or community level. A post-drought evaluation assessment of the whole response by communal households and key institutions that were actively involved in the response and preparation phase, such as GRN, the Red Cross, the World Food Programme, FAO, and UNICEF should be conducted to draw realistic recommendations that will assist with future improvements. Finally, the study recommends the establishment of a GRN drought recovery programme for communal households. In this case, the GRN, through the Ministry of Agriculture, Water and Land Reform, Traditional Authorities, Village Headmen, and the Regional Council, should continuously identify, update, and profile vulnerable communal households, as this will ensure that post-drought recovery assistance is rolled out to the most destitute households.

Keywords: Drought, Communal farmers, Household, Livelihood, Readiness, Response, Recovery

Chapter 1: General Introduction

1.1 Introduction

The chapter mainly focuses on the research background that has inspired and propelled this study. It highlights the research problem by means of the problem statement, which surrounds effective drought readiness, response, and recovery mechanisms employed by communal farmers in improving livelihoods. The overall and specific research objectives established by the research problem are outlined, revolving around three research questions. This chapter also includes the significance, delimitations, assumptions, and limitations of the study.

1.2 Background

Namibia is geographically located alongside Africa's southwestern coast and shares borders with Angola, Zambia, Zimbabwe, Botswana, and South Africa (Green, 2021). Namibia occupies an area of 824,290 km^2 and has adopted three (3) categories of land tenure systems, namely: communal, freehold, and state land (Namibia Statistics Agency [NSA], 2018). Namibia is divided into four geographical regions: the Namib Desert, the Namib Escarpment, the Central Plateau, and the Kalahari Sand Veld (Dansie, Thomas, Wiggs & Munkittrick, 2017). Namibia is an arid country, characterised by sporadic rainfall and climate patterns (Angula & Kaundjua, 2016). Namibia has an annual evaporation rate that is as high as 3,700 mm (Dansie et al., 2017).

Namibia is one of the African countries with high daily temperatures that increasingly fluctuate over time, especially in the Namib Desert. The Namib Desert has vegetation that thrives well in hot climatic conditions since moisture is slight (Dansie et al., 2017). Neighbouring the Namibian coast is the Atlantic Ocean that regulates daily temperatures (Mupambwa, Hausiku, Nciizah & Dube, 2019). Furthermore, the Namib Desert is one of the unique ecosystems in Southern Africa for the reason that it stretches along the Atlantic Ocean, which the Benguela current upwelling system produces high ocean food production for aquatic life. Mupambwa et al. (2019) further state that the Benguela current that stretches along the South West African coastal area is the driving force behind the dry environmental conditions experienced in the Namib Desert.

Namibia is regarded as the most arid country in the southern part of the Sahara in Africa (Hegga, Ziervogel & Angula, 2016). Agricultural production is generally low due to aridity, which is branded by a dry climate and a poor soil structure. Natural disasters, such as prolonged droughts and repeated flash floods, put more pressure on already deprived environmental conditions. These natural disasters are therefore causing serious distractions to the land's ability to produce sufficient food. This in turn leads to food insecurity, which has a direct relationship to poverty and income inequality (United Nations Development Programme [UNDP], 2011). A programme in Namibia that deals with combating desertification was officially launched in 1994. Protection of the ecosystem complements Namibia's efforts to address cultural and socio-economic concerns (UNDP, 2011).

It is evident that reoccurring droughts have threatened and added more pressure to the country's food security, with complementary efforts from both the GRN and the private sector to address drought. Rothauge (2018) defines drought as a period of several months or even years of irregular dry conditions as a result of poor rainfall below average, hence resulting in decreased agricultural productivity. Drought primarily results in lower-than-average agricultural output and contributes to severe socio-economic interference with human livelihoods (Rothauge, 2018). Furthermore, it has been noted that drought has regularly occurred in the Namibian environment for the past years, and it has negatively impacted the socio-economic livelihoods of many Namibians, especially the fraction of the population living in communal areas.

It is estimated that about 58% of the Namibian population lives in communal areas where agriculture is the primary source of sustainable livelihood (Namibia Statistics Agency [NSA], 2015). The previous Namibia's census of agriculture in the communal sector was conducted in the 2013/14 financial year. Results show that the overall population of agricultural households in the communal sector was 907,715 at the time of the census. A total of 417,566 (46%) were male, while the remaining 490,149 (54%) were female (NSA, 2015). As communal farming is practiced in communal areas, Balcha (2013) defines smallholder farming as a process in which a family produces food that is fundamentally sufficient to feed the household alone. Balcha (2013) further highlights that in smallholder agricultural farming, there is

normally minimal harvest to market, and in instances of surplus, and the harvest is normally stored to sustain the household until the next harvest.

Smallholder farming is widely recognised as an effective agricultural farming technique in rural areas of sub-Saharan Africa, and the majority of rural communities rely heavily on it for survival (Siphesihle & Lelethu, 2020). This approach is applicable to the majority of communal farmers. It allows food production at a minimal cost. It also creates an incredible opportunity to continue living in rural areas where basic living, which includes housing and land, is relatively affordable. The majority of rural communities in sub-Saharan Africa are self-sufficient in terms of basic food production at the household level in normal circumstances. Ideally, nothing necessitates external procurement, as locally produced food is readily available at their disposal (Balcha, 2013).

In the Namibian context, agricultural activities in communal areas are limited by the country's scarce water resources and minimal arable land, which accounts for just 1 percent of the country's landmass (Word Bank, 2015). Despite contributing only 5% to the Gross Domestic Product (GDP) and acknowledging that agriculture is struggling, agriculture remains an essential sector for the Namibian economy and the global food system in promoting food security, employment creation, and poverty reduction (United Nations, 2021). The Namibia Agronomic Board (2017) reported that the shortage of productive land means that livestock farming performed on freehold range is dominating the agriculture sector in Namibia, and, as a result, internal food production is inadequate and cannot sustain the domestic demand. In order to meet the shortfall, most of the country's food has to be imported. For instance, Namibia was required to import 50 percent of all cereal supplies, such as pearl millet, sorghum, wheat, and maize, during the 2016/17 financial year (Namibia Agronomic Board, 2017). The Namibia Agronomic Board (NAB) Border Control Inspectorate controls all Namibian borders with the key aim of regulating the flow of agronomic and horticultural goods into and out of Namibia (Namibia Agronomic Board, 2022). The goal is twofold: first, to establish effective local marketing channels for agronomy and horticultural commodities in the event of border closures and/or import restrictions on certain horticultural products. Second, to protect consumers in Namibia and in export markets against items of questionable quality and food safety issues. Additionally, the NAB is mandated to manage several entry and exit border points into Namibia, namely: (i) Noordoewer, (ii) Ariamsvlei, (iii) Buitepos, (iv) Muhembo, (v) Ngoma, (vi) Wenela, (vii) Katwitwi, (viii) Oshikango, (ix) Omahenene, and (x) Walvisbay.

Forestry is basically not regarded as a crucial driving force in the Namibian economic sector in terms of GDP contribution but is crucial for rural communities through community-based rural development (Benkenstein, Hengari & Mbango, 2014). On the other hand, Benkenstein et al. (2014) further underlined that, despite Namibia's lack of commercial forest and timber resources, the woodland savannah plays an important role in terms of socio-economic activities, including the supply of wood and timber for wood carving. Benkenstein et al. (2014) went on to emphasise that Namibia's woodland savannah forms part of Southern Africa's wide-ranging dryland forests. These dryland forests are gradually being recognised as valuable, but yet they are threatened ecosystems by illegal logging activities. As such, they still play a major role in supporting socio-economic livelihoods in the region. The benefits associated with forests are not only ecological, but they are also beneficial to local livelihoods, particularly in rural poor communities (Vrabcová, Nikodemus & Hájek, 2019).

Improved governance of Namibia's resources is fundamental, and the fishing sector contributes 3 percent to the country's GDP (GIZ, 2020). Over the past years, Namibia's economy has been growing at 4.5 percent annually, but given circumstances like the COVID-19 pandemic, international conflicts, and persistent droughts, commodity prices are expected to keep fluctuating. This will challenge the growth of the economy and threaten the attainment of the 2030 Agenda for Sustainable Development for Africa. These situations have the potential to exacerbate current socioeconomic issues such as insufficient food supply, and increased poverty, income disparity, and unemployment (UNDP, 2022). Drought has become common, fostered by Namibia's hot, dry climatic conditions and erratic rainfall patterns. The scarcity of water for agriculture, desertification of arable land, and land degradation are all fundamental environmental challenges experienced by the agricultural sector (Rothauge, 2018). Other threats to the country's biodiversity include the following: habitat destruction and unsustainable agricultural practices; deforestation to pave the way for economic development; overstocking; illegal poaching of endangered wildlife species; and unsustainable harvesting of wild plants and animals. Other factors include the unequal distribution of financial resources, illegal fencing on communal land, and the destruction of legally protected areas and other prominent tourist sites (Ministry of Environment, Tourism and Forestry, 2020).

Namibia's environment is considered the primary source of the country's economy, be it for food production or socio-economic empowerment for the majority of Namibians, especially those residing in communal areas. However, Namibians living in northern communal areas are increasingly experiencing continued climate variability. This is associated with erratic rainfall patterns, more frequent and severe flash floods, persistent droughts, and increased temperatures (Angula & Kaundjua, 2016). Moreover, Angula and Kaundjua (2016) went on to highlight that climate change is associated with threats to food production, water security, poor grazing pastures for livestock, and a high vulnerability to land degradation, deforestation, and desertification. North-central Namibia is regarded as being more susceptible to the effects associated with climate change because about 57 percent of its rural communities rely heavily on communal farming for sustained livelihoods (Angula & Kaundjua, 2016).

Due to the aridity of the Namibian environment, livestock and crop production are primarily dependent on the productivity of the natural vegetation, which varies over time and is fostered by unpredictable rainfall patterns (Rothauge, 2018). Namibians, if not all, can attest that it rained much better in August 2016, for the first time in a long time, by giving Namibians a sign of relief and a significant warning sign to adjust to what nature may offer in the long run (Shinedima, 2019). Nevertheless, Shinedima (2019) further narrates that although there have been some improvements in rainfall since 2016, it is still erratic in most parts of the country. This threatens the country's sustainable agricultural productivity since most of the communal households rely directly on rainfall.

1.2.1 Seasonal rainfall outlook for Namibia

Namibia projected normal to above-average rainfall over the first half of the 2019/20 rainfall season (October, November, and December). Average to below-average rainfall was expected in the next half of the rainfall season (January, February, and March), with the exception of the Zambezi region, which expected average to above-average rainfall (Figure 1). There was a 35% prospect within the above-average category, a 40% prospect within the average category, and a 25% prospect in the below-average category for the first half of the rainfall season (Ministry of Agriculture, Water and Forestry [MAWF], 2019). During the second half of the rainfall season, the majority of parts of Namibia expected a 25% prospect in the above-average category. Furthermore, there was a 40% prospect in the average category and a 35% probability in the below-average rainfall category, while the Zambezi region had a 35%

probability in the above-average rainfall category, a 40% prospect in the average category, and a 25% prospect in the category of below-average rainfall (MAWF, 2019).

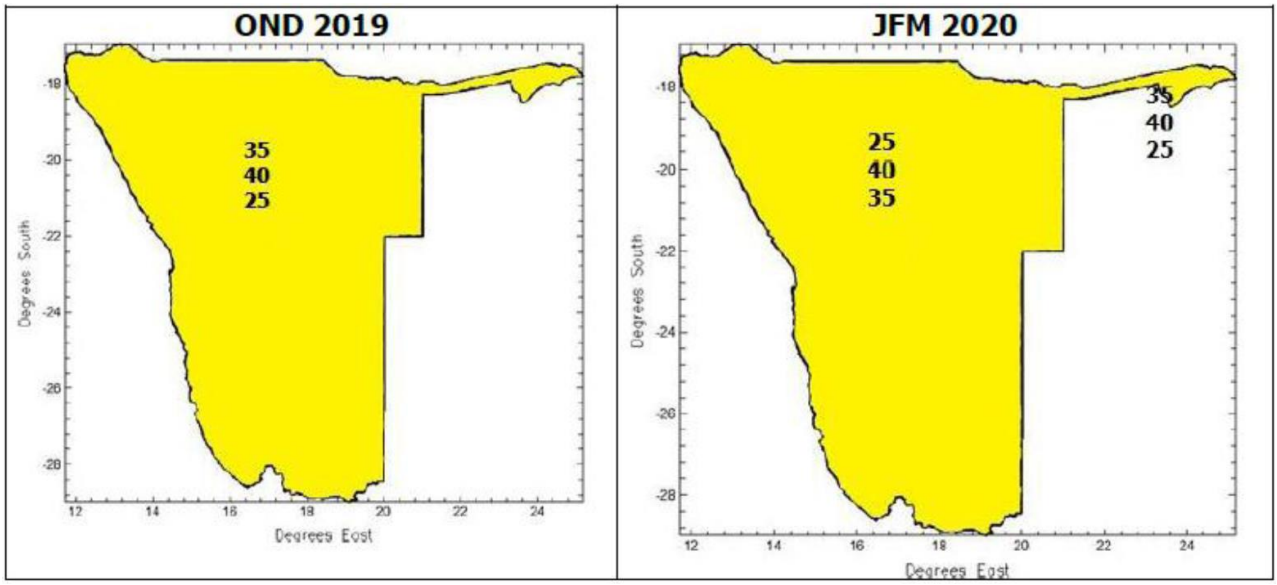

Figure 1: Namibia's rainfall outlook from October 2019 to March 2020

Source: (MAWF, 2019)

Legend: "OND" means October, November, and December while **"JFM"** means January, February, and March.

Despite rainfall predictions presented in Figure 1, the first half of the 2019/20 rainfall season was poor and associated with irregular and insufficient rainfall patterns, as well as extreme temperatures (MAWF, 2019). However, after the commencement of the rainfall season, it was observed that there was a lack of follow-up rainfall to reinforce the amount of rainfall received early in the season. As such, minimal rainfall was recorded at the onset of November 2019, which led to a severe drought that affected the livelihoods of communal farmers. This is a concern for the reliability of the present early warming information system on the rainfall forecast by the Meteorological Services of Namibia. To scale up reliability, there is a need for policy intervention to address all aspects associated with national risk knowledge, monitoring and early warning services, dissemination, communication, and response capability. If these issues are addressed, effective and prompt readiness, response, and recovery efforts can be realised through reliable forecasting.

1.2.2 The 2018/19 agricultural drought overview

According to Hilukilwa (2018), the northern areas of Namibia were hit by the 2018/19 agricultural drought that was never experienced before in previous years. Hilukilwa (2018) added that in terms of agricultural production on crop fields, the majority of private tractor owners could not be contracted to plough mahangu fields, and seed sellers could not market their seeds. Furthermore, most unemployed women and youths, who normally practice income generation groups normally contracted to help communal farmers with several farming activities, were inactive. The drought situation, especially across Namibia's northern border of the country in southern Angola, was not any better than thought. Angolan nationals who visit Namibia to go shopping, access health facilities, or visit relatives testified that the drought situation has equally affected the southern parts (Hilukilwa, 2018). Shikangalah (2020) stated that unsuccessful agricultural production worsened household food security. Many households were dependent on the formal and informal markets to access household food supplies, while others depended on drought relief food parcels (MAWF, 2019).

Namibia's water supply situation for agriculture in particular was negatively affected by the drought. The MAWF (2019) reported poor water supply in Ohangwena, Omusati, Oshana, and Oshikoto region, as the majority of reliable water catchments already received insufficient inflow during the past rainy season. As a result of low inflow, the majority of communal farmers solely relied on pipelines, non-natural wells, and boreholes; hence were costly since they were associated with costs. In the north-eastern regions (Zambezi, Kavango East, and Kavango West regions), water supply was noted to be adequate, with the main source being perennial rivers supplemented by boreholes and non-natural wells within the inland areas (MAWF, 2019).

In the southern and western parts of the country, the ground water table level was low and below average pumping levels, resulting in low water yields associated with frequent borehole breakdowns. The MAWF (2019) further highlighted that, as of 19 December 2019, the water capacity in the majority of dams and reservoirs across the country, as shown in Figure 2 were below their normal holding capacity, because of low water inflow received during the 2018/19 rainfall season compared to the 2017/18 rainfall season. The water supply situation in the Omusati region was a concern in most areas, as most of the human-made earth dams were completely dry and communal farmers were only dependent on pipeline water, natural wells, boreholes, or canals to access water (Shikangalah, 2020).

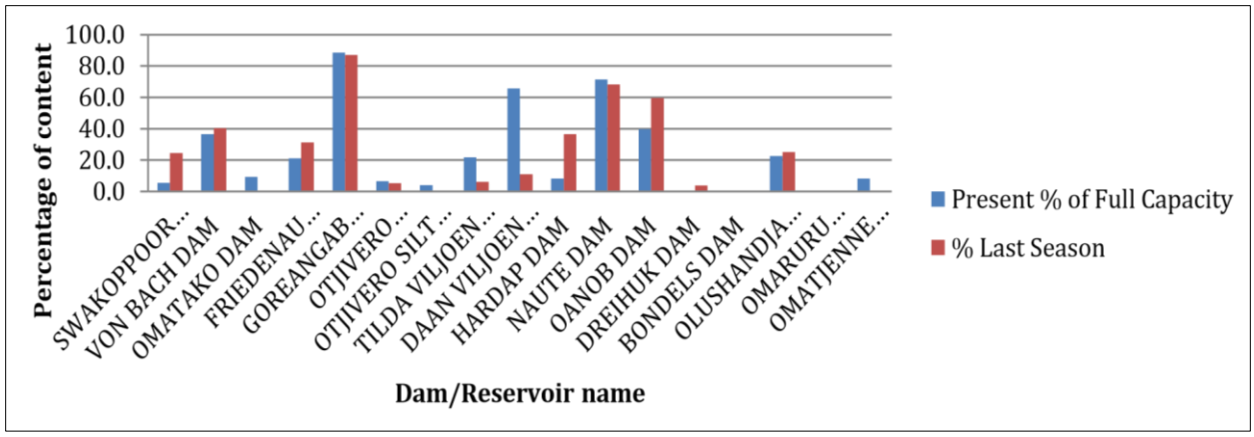

Figure 2: Summary of dam levels in Namibia as of December 19, 2019

Source: (MAWF, 2019)

1.2.3 Livestock conditions in Namibia

The MAWF (2019) reported through the Agricultural Inputs and Household Food Security Situation report of 2019 that over 88,219 livestock mortalities were reported as a result of the country's severe drought from the beginning of October 2018 to the end of September 2019. As shown in Table 1, which is retrieved from the Agricultural Inputs and Household Food Security Situation report by MAWF (2019) exhibits that cattle account for more than 56 percent of livestock mortalities reported, followed by goats at 31 percent, sheep at 12.3 percent, and donkeys and horses at less than 1 percent each. It is worth noting that a number of regions did not indicate any livestock mortality in some livestock categories (MAWF, 2019). This does not necessarily mean that there was no livestock mortality recorded, but verified figures were not available at the time of the agricultural inputs and household food security situation assessment exercise by the MAWF. Hardap, Kavango East, Khomas, and Zambezi regions were identified as having missing data in their reports on most categories of livestock mortalities.

Table 1: Livestock mortalities from October 2018 to September 2019

Region	Cattle	Goats	Sheep	Donkeys	Horses
Erongo	10,162	4,026	2,364	246	103
Hardap	20	0	0	0	0
//Kharas	2,738	14,069	1,148	0	0
Kavango East	0	0	0	0	0
Kavango West	59	8	539	0	0
Khomas	810	0	0	0	0
Kunene	8,681	2,602	4,357	102	79
Ohangwena	6,574	916	26	22	0

Omaheke	2,517	1,421	742	40	95
Omusati	6,412	1,378	88	150	0
Oshana	1,776	458	10	121	0
Oshikoto	1,984	80	12	11	0
Otjozondjupa	7,426	2,143	1,559	23	46
Zambezi	76	0	0	0	0
Total	**49,235**	**27,101**	**10,845**	**715**	**323**

Source: (MAWF, 2019)

In view of the above, this study investigated the readiness, response and recovery efforts of communal farmers of Eengolo settlement towards the 2018/19 agricultural drought. This settlement is situated in Outapi Constituency, Omusati Region, Namibia. The study was aimed at assessing how well-prepared communal farmers were prior to the 2018/19 agricultural drought, what response approaches communal farmers and the government employed to lessen the impacts of the drought, and lastly, how communal farmers recovered from the drought. Aspects of how they intend to be prepared in the event of future droughts were also covered. As such, better projection is attainable, which involves the timely and sufficient distribution of resources, be they technical or financial. This support is vital in supporting, capacitating, and building resilience at the rural household level. Hence, sound conclusions and appropriate and well-informed recommendations are comprehensively supported by the findings resulting from this study.

1.2.4 The 2018/19 agricultural drought response mechanism

The 2018/19 rainfall season was worrisome as many parts of the country have not received significant rainfall, and the rainy season has passed, indicating another severe drought (Office of the Prime Minister [OPM], 2019). On May 6, 2019, the Head of State, His Excellency Dr Hage Gottfried Geinghob, pronounced a countrywide drought emergency in order to lessen the impact of the drought on the vulnerable rural population. The announcement was made in accordance with Article 26 of the Namibian Constitution and Section 30 of the Disaster Risk Management Act No. 10 of 2012. According to the president:

> Following consultations with the Cabinet and the wider government system, I declare under Article 26 of the Namibian Constitution that a state of emergency exists on account of the natural disaster of drought in all regions of the Republic of Namibia. Offices, ministries and agencies and all other stakeholders will be mobilised to ensure that the necessary assistance is

rolled out to affected communities. During this period, the GRN shall endeavour at all times to protect all Namibians and their livestock from the drought (United Nations Namibia, 2020, p. 2)

1.3 Problem statement

The 2018/19 rainfall season in Namibia was poor, with a significant delay in the rainfall. The said rainfall season can be described by erratic rainfall patterns associated with extremely high temperatures (OPM, 2019). As such, high water evaporation as a result of extreme temperatures negatively impacted farmers' agricultural production, and the already precarious water resources exacerbated the situation. Communal farmers experienced high livestock mortalities, crop production losses, and deteriorated livelihoods. This study was aimed at carrying out an in-depth assessment of the readiness, response, and recovery efforts of communal farmers in Outapi constituency. Drought management is vital in ensuring that communal farmers cope with 2018/19 agricultural drought. Communal farmers were expected to employ readiness mechanisms informed by early warning information systems in the community. Drought readiness and response mechanisms are expected to minimise losses on crops and livestock production and the overall livelihoods of communal farmers. Recovery strategies are aimed at employing actions to return to the normal state while ensuring that resilience is strengthened to deal effectively with future droughts.

Existing literature by various scholars profiled the socioeconomic impacts of the 2018/19 agricultural drought on the livelihoods of communal farmers; however, a gap was identified as little emphasis was placed on profiling drought readiness, mitigation, and recovery efforts by communal farmers. The most notable issue observed was that communal farmers and institutions involved in drought institutional coordination typically use reactive strategies based on the current situation while being expected to employ proactive strategies that are beneficial in the long run. According to the existing literature, reactionary approaches are costly and often lead to a dependency syndrome between GRN interventions and humanitarian aid. The use of a reactive approach has resulted in significant drought impacts, as profiled by various scholars. It is for that reason that this study was vital in assessing and recommending effective drought readiness, response, and recovery mechanisms for communal farmers, the government, and the private sector. It is expected that all matters resulting from this study will greatly assist in improving communal farmers' livelihoods if they are applied effectively. Henceforth, prospective losses will be mitigated, and household coping capacities will be strengthened. These issues henceforth explain the commissioning of this study.

1.4 Research objectives

1.4.1 Overall objective

The aim of the study was to assess the readiness, response, and recovery efforts of communal farmers towards the 2018/19 agricultural drought.

1.4.2 Specific objectives

- To assess the level of readiness by communal farmers prior to the 2018/19 agricultural drought.
- To analyse drought interventions employed by communal farmers and other stakeholders (government, development partners, and private sector).
- To analyse post-drought recovery strategies employed by communal farmers and other stakeholders (government, development partners, and private sector).

1.5 Research questions

- To what extent was the level of readiness of communal farmers prior to the 2018/19 agricultural drought?
- How effective were the drought interventions employed by communal farmers and other stakeholders (government, development partners, and the private sector)?
- How effective were the post-drought recovery strategies employed by communal farmers and other stakeholders (government, development partners and the private sector)?

1.6 Significance of the study

The drought in Namibia under review has been profiled in terms of its impacts by many scholars. However, the level of readiness, interventions, and recovery measures of communal farmers, GRN, development partners, and the private sector received slight emphasis. This study is important in several ways. Firstly, it assessed the level of drought readiness, effective interventions, and effective recovery efforts of communal farmers in the area of Eengolo settlement in Outapi Constituency. It provided a much better understanding of the interaction between communal farmers, government agencies, non-governmental organisations, and the private sector. This helps in contributing towards a more efficient, proactive responsive, and accountable drought approach within the communal sector of Namibia.

The undertaking of this study is worth all the efforts because it addresses a critical phenomenon in the country's agricultural sector. Furthermore, it is important because it deals with a crucial theoretical issue that has practical and methodological value. Despite the fact that drought is a normal part of the climate, it is one of the most prevalent and devastating natural disasters. Drought impacts cannot be completely ignored, and therefore more emphasis in terms of research has to be recognised, and therefore it was empirical that a study of this magnitude was conducted. Failure by communal farmers, the central government, government agencies, non-governmental organisations, and the private sector to employ appropriate and sustainable drought management approaches will negatively impact the already struggling agricultural sector. Drought has serious threats directly linked to the agricultural sector, such as food insecurity, high commodity prices, a high inflation rate, a high unemployment rate, and a weakened economy. The imminent dangers of drought are a major crisis in the country's agricultural sector and all other sectors of society.

Secondly, the study findings will assist in re-structuring and calling for a robust revision of existing legislation and national disaster response structures in Namibia. These structures are designed and geared towards the country's responsiveness to all types of natural disasters, particularly the National Drought Policy, which is currently under review by the MAWLR. The challenges faced at various institutional levels and their relationships within the communal setup are particularly relevant. Establishing a fundamental understanding of the interrelationships that exist among institutions that play a role in drought management helps identify specific areas where improvement is required. This way, it helps in effective drought management coordination and improves future drought management across all parties.

Finally, this study includes extensive scholarly literature, which is essential for any study, and it contributed to the existing body of knowledge on drought readiness, interventions, and recovery actions in Namibia. This project will fill the knowledge gap that exists between existing work by various scholars covering the impact of the 2018/19 agricultural drought and the readiness, response, and recovery strategies taken by communal farmers and institutions involved in drought management. Study findings and recommendations will inform the identification of additional areas for future research.

1.7 Assumptions of the study

The following assumptions were considered when conducting this investigation. It was assumed and discovered:

The respondents fully understood the questions they were asked by the interviewer. This was accomplished by clarifying every aspect of the questionnaire that required more clarification. Another contributing factor is that the questionnaire was translated into the vernacular language prior to data collection.

The study notes that respondents were truthful in expressing their understanding of the 2018/19 agricultural drought occurrences. The respondents were eager to truthfully participate since the drought under review had a negative impact on their livelihoods, and they believed that their full and honest participation would aid in establishing sustainable drought management measures. Another key contributing factor is that the anonymity and confidentiality of the information collected were preserved, and the respondents had the right to withdraw from the study at any given time with no consequences.

1.8 Delimitation of the study

The socio-economic impact of the 2018/19 agricultural drought on communal farmers has been well documented and profiled by a number of environmental and economic scholars. Many scholars have overlooked and understated communal farmers' readiness and recovery efforts in relation to the drought under review. As a result, the majority of communal farmers and the public and private sectors have previously focused only on interventions aimed at mitigating drought effects during the drought, which many consider to be excessively expensive. In a nutshell, instead of applying proactive approaches, the government, several institutions, and communal farmers have always been reactive to drought events as they occur. In light of this, this study assessed the level of communal farmers' drought readiness, interventions, and recovery efforts in response to the drought event, with the drought in question being Namibia's 2018/19 agricultural drought. Briefly, the study assessed communal farmers' level of drought readiness, how they responded to the drought, and how they recovered from the drought under review.

In terms of the study area selection, the study purposefully selected Outapi Constituency out of a number of constituencies. This selection was implemented and informed by a literature review, as it was highly affected by the 2018/19 agricultural drought under review in terms of livelihoods. This particular study was limited to the Eengolo settlement within Outapi Constituency in the Omusati region. As per the defined boundary line of the Namibian map, this constituency is one of the 121 electoral constituencies in Namibia and forms part of the 12 constituencies, namely: Anamulenge, Elim, Etayi, Ogongo, Okahao, Okalongo, Onesi, Oshikuku, Otamanzi, Ruacana and Tsandi in the Omusati region.

The study only interviewed communal households in five villages of the Eengolo settlement. Fieldwork by means of data collection ended only after all sampled communal households and identified key informants were interviewed, and all interviews were completed and verified. As part of data collection, a comprehensive questionnaire was administered to the head of the household at the household level. This study consulted only key stakeholders who play a key role in the implementation of drought-related readiness, interventions, and recovery at the national, regional, and constituency levels. The aim was to profile and understand other underlying concerns related to communal farmers' and institutional drought readiness. Implementation levels of legislation, challenges, and drought-related interventions aimed at mitigating the socio-economic effects of drought were also covered.

This study solely focused on assessing the readiness, response, and recovery efforts of communal farmers towards the agricultural drought under review, but not on other natural disasters such as flash floods that are common in the area. Policy recommendations and interventions that emanate from this study are solely focused on and limited to the drought phenomenon. This study therefore suggests that a study focusing on the readiness, response, and recovery of communal farmers towards flood events in Namibia could be undertaken.

1.9 Limitations of the study

It is highly likely that every study will eventually meet limitations, and for this study, a number of limitations were met. A number of limitations were faced in several phases of the implementation of this study, but there were mitigations to address these limitations.

- Insufficient financial resources were experienced in the course of commissioning this study. Nevertheless, alternative financial arrangements were planned in case of financial shortage, and this aided immensely in addressing this specific drawback.
- During fieldwork, it was observed that a number of communal households, particularly elderly residents, had difficulty remembering key information pertaining to the drought. However, caution and patience were observed to clarify more about what was being asked so that accurate, reliable, and appropriate information could be collected.
- Since the preferred respondent was the head of household, the majority of household heads were physically unavailable for interviews as they were out of the region with mostly employment obligations. In that scenario, interviews were conducted with the available adult as an alternative. However, in some cases, a replacement was employed. However, careful probing was observed to get the intended information.
- Due to the high number of national COVID-19 infections at the time of fieldwork, a few respondents were hesitant about researchers and assistants accessing their households for face-to-face interviews. However, all necessary precautions were observed in accordance with the set health regulations by the Ministry of Health and Social Services.
- Initially, the researcher chose to apply the multinomial logistic regression analysis approach to analyse how independent variables (gender, educational level, and marital status) influence the choice of dependent variables (drought readiness, response, and post-recovery strategies). However, after carefully examining the feasibility of employing this method, it was realised that the format in which the data was collected was not fully compatible with this analytical approach. It is for that reason that all alternative analytical methods (cross-tabulation, chi-square, and thematic analysis) were employed instead.

1.10 Thesis outline

This thesis is structured into five chapters.

Chapter 1: Introduction

Chapter 1 provides an overview of the background information pertaining to Namibia's agriculture, the 2018/19 agricultural drought, the problem statement, research objectives, and research questions. Components of the study, such as significance, assumptions, delimitations, and limitations, were also covered.

Chapter 2: Literature Review

Chapter 2 entirely focuses on a literature review on drought by reviewing several scholarly sources, taking into account the theoretical and conceptual framework. This includes the general concept of drought, types of drought, trends in global droughts, drought trends in Africa, impacts of drought in developing states, drought management and response, national drought policies, adaptation, and building resilience to drought at the rural household level. Drought history in Namibia is profiled, including existing drought readiness, response and support structures, drought monitoring and early warning, and drought vulnerability assessment in Namibia.

Chapter 3: Methodology

Chapter 3 provides an overview of the study area, focusing on the topographical location, demography, and agricultural production. Furthermore, it highlights the scope, research design, data collection methods employed, detailed sampling procedures employed, data analysis methods, and study ethics.

Chapter 4: Results and discussion

Chapter 4 focuses on the presentation of the study findings that emanated from the data collected, with visual and statistical analysis presented in graphs and tabular format and discussions of the study results.

Chapter 5: Conclusion and Recommendations

Chapter 5 provides the study conclusion and suitable recommendations that can be employed that have a better opportunity to transform existing drought management approaches.

Chapter 2: Literature Review

2.1 Introduction

Chapter 2 exclusively focuses on the review of several scholarly sources while taking into account the theoretical and conceptual framework. This chapter begins by covering the general concept of drought, types of drought, and trends in global and African droughts, as well as the impacts of drought in developing states, drought management and response in developing states, national drought policies, adaptation, and building resilience to drought. Drought history in Namibia is profiled, as are existing drought readiness, response, and support structures in Namibia. Drought monitoring and early warning in Namibia and drought vulnerability assessment in Namibia were also covered.

2.2 Theoretical framework

2.2.1 The concept of drought

Drought is a common natural disaster caused by a change in a specific area in long-term weather conditions associated with a continued lack of water as a result of deviation from normal conditions (Meza et al., 2020). However, it may have a long-term impact on wide areas and can even last for months or years, with an impact on food production, life expectancy, and the economic performance of affected regions. Vogt et al. (2018), however, supported the view by Meza et al. (2020) that droughts are recurrent, can last a few months or even several years, and affect large populations in different parts of the world every year. Zarafshani, Sharaf, Azadi and Passel (2016) reinforced the notion by Meza et al. (2020) that drought is a normal part of the climate and is known to be a costly natural disaster that occurs in almost all parts of the world. Drought frequency, duration, and intensity have all increased globally, posing a consistent global threat to food security (Ngcamu & Chari, 2020).

Drought has a wide-ranging impact on many sectors of the economy and extends far beyond the area experiencing the physical drought (Meza et al., 2020). Furthermore, water is essential to society's ability to produce goods and provide services, so this complexity exists. Literature shows that there are two types of drought impacts: direct and indirect. Reduced crop production, reduced ability of the rangeland to produce fodder, reduction in forest productivity, increased fire threats, diminished water levels, a spike in livestock and wildlife mortality rates, and loss of fish habitat are all direct consequences (Meza et al.,

2020). The implications of these direct impacts demonstrate indirect consequences, whereby a reduction in crop production, rangeland, and forest productivity are all associated with reduced income for farmers and agricultural industries. Also, a sharp spike in food prices and an increased unemployment rate since agriculture employs the majority of the world's population are other indirect effects. A reduction in tax revenue collection by the government because of a decline in spending, defaulting on bank loans by farmers and agribusinesses, excessive rural-urban migration, and natural disaster relief programmes are all indirect impacts (Vogt et al., 2018).

Drought has an economic, environmental, and social impact (Liu et al., 2020). Impact is pronounced in the sense that since agriculture and related industries rely heavily on surface and groundwater supplies, there are many economic consequences. They are associated with insect invasions, plant disease, and wind erosion, in addition to yield losses in crop and livestock production (Liu et al., 2020). Furthermore, environmental losses are caused by the destruction of plant and animal species, air and water quality, wildfires, land degradation and soil erosion, and the loss of biodiversity. Human welfare changes should be taken into account when calculating the socio-economic effects of drought, because drought's social consequences can affect people's health and safety. This may result in conflicts within society when water restrictions are imposed, and may also result in lifestyle changes (Vogt et al., 2018). Drought limits and delays the attainment of several global Sustainable Development Goals (SDGs), particularly SDG 1 focusing on no poverty, SDG 2 focusing on zero hunger, SDG 3 focusing on good health and well-being, and SDG 15 focusing on life on land (Meza et al., 2020).

2.2.2 Defining drought

The term drought is commonly used, but no distinctive or accurate definition exists across all disciplines. Vogt and Somma (2013) pointed out that, to date, there is literally no consistent and accepted world-wide definition of drought. Vogt and Somma (2013) further added that any drought definition should be aligned to a specific region under investigation and applied to that particular application. Besides, drought definitions are frequently updated to reflect current situations and frameworks, but researchers, scientists, and economists, in particular, must consider drought impacts and complex connections with the environment and society.

Vogt et al. (2018) broadly define drought as a period of abnormal dry weather conditions long enough to cause a serious hydrological imbalance. Vogt et al. (2018) went on to say that drought is generally caused

by a lack of precipitation over a specific period of time, leading to water imbalance as a result of increased atmospheric water demand triggered by high temperatures or normally strong winds. Wilhite (2011) supports the definition of drought, which is similar to that of other cited scholars, as a lack of precipitation that lasts longer than a season and believes that effective early warning systems are the foundation of all effective drought readiness plans. A definition of drought by Dierauer and Zhu (2020) did not vary greatly from other drought definitions, as they defined drought as a continued period of below-average availability of precipitation. Drought is considered one of the key weather-related disasters in the world.

However, Maliva and Missimer (2012) signalled out the prime, distinct difference between aridity and drought, which has been confused by many. They gave a well-defined definition of aridity as a term that the majority of people conceptually understand as images of dry desert lands with slight natural surface-water bodies and rainfall and commonly only inhabited by limited vegetation, which thrives in water scarcity environments. Maliva and Missimer (2012) further state that aridity is mainly the result of persistent atmospheric patterns or regional topography. The cause of aridity is not generally limited to local groundwater management, but aridity is a long-term climatic condition with which local populations must adapt regardless of its primary cause (Maliva & Missimer, 2012).

Drought is a concept that is generally understood on a basic level, but is somehow difficult to quantify by many. Maliva and Missimer (2012) provided their insight on drought, whereby they defined it as a meteorological condition that is characterised by a lengthy and abnormal lack of moisture in the environment. Another definition is that drought can, on the other hand, be generally defined as a temporary and recurring reduction in the level of precipitation in a defined area (Maliva & Missimer, 2012). Droughts should, however, not be treated as an abnormal event but rather as an interim variation in the normal water supply in a defined area (Loon, 2015). Moreover, aridity is the general feature of an arid climate and is a long-lasting condition, whereas drought is a short-term condition.

2.2.3 Types of drought

Drought is a normal and recurrent feature of the climate that happens in nearly all climate zones around the world (National Oceanic and Atmospheric Administration, 2018). The duration of droughts varies widely, and Mtetwa (2018) categorises droughts into four types, namely: meteorological, hydrological, agricultural, and socio-economic droughts. Edossa, Woyessa and Welderufael (2014) supported this classification by further asserting that all drought types are instigated by a shortage in precipitation. A

deficit in precipitation mostly impacts natural resources and may lead to what is referred to as droughts (Aghelpour, Mohammadi, Biazar, Kisi & Sourmirinezhad, 2020).

2.2.3.1 Meteorological drought

Several scholars exclusively explained the meteorological drought. Loon (2015) explained that meteorological drought refers to a precipitation deficiency, possibly combined with increased potential evapotranspiration, extending over a large area and covering an extensive period of time. Mtetwa (2018) specified that occasionally meteorological droughts are well-defined by the deviation between present rainfall figures and the average rainfall figures normally received monthly, seasonally, or even annually. Hence, the intensity and duration of a meteorological drought are important factors in identifying it. In a separate case, Mtetwa (2018) believes that the general meaning of meteorological drought is basically aligned to region-specific conditions because climatic conditions that result in low rainfall generally fluctuate among regions. Hence, as a result, it is critical to consider other additional aspects of the climate, such as evaporation and temperature, to fully identify, understand, and classify this type of drought. Smallholder farmers must fully understand this type of drought in order to plan and implement suitable readiness, response, and recovery strategies that correspond with and address the impacts associated with this specific drought.

Meteorological drought is associated with both negative and positive impacts regarding the readiness and recovery of smallholder farmers. The negative implications are that, because the majority of developing countries are agriculture-based economies with direct dependence on climate change, the appearance of a meteorological drought may result in a substantial decline in agriculture yield, particularly in arid regions (Waseem, Khurshid, Abbas, Ahmad & Javed, 2022). The positive impacts associated with a meteorological drought in terms of readiness and recovery for smallholder farmers are that it helps in rebalancing the health of wetlands and other water sources. This is achieved in the sense that, as water evaporates from the ground surface, essential nutrients are left behind. These nutrients will enrich the ecosystem and therefore allow the development and growth of new vegetation. All these processes assist smallholder farmers in giving ample time to farmers in order to adequately prepare for a potential drought and applying the relevant mechanisms geared towards recovery (Waseem, Khurshid, Abbas, Ahmad & Javed, 2022).

2.2.3.2 Hydrological drought

Hydrological drought is basically classified by the lack of water in the water system, as displayed by abnormally low water flow and levels in rivers, lakes, reservoirs, and groundwater (Loon, 2015). Moreover, hydrological droughts are able to cover wide-ranging areas and can last for months or years. They are associated with overwhelming negative impacts on the environmental system and many other economic-related sectors. Loon (2015) further singled out a number of affected sectors. These sectors include water supply for drinking and sanitation, vegetation production (irrigation), waterborne transportation, and hydropower production, which is viewed as clean energy. On the other hand, Dierauer and Zhu (2020) gave a similar definition as defined by Loon (2015): hydrological drought is the abnormality in the level of surface and subsurface water, which is characterised by below-normal groundwater levels or water levels in water bodies such as lakes, hence weakening wetland areas and reducing river outflows. Hydrological droughts are basically characterised by less than normal average amounts of water in different types of water systems, and their impacts extend beyond agriculture to other sectors (Food and Agriculture Organisation [FAO], 2019). Public water supplies and hydropower production are two examples of negative impacts on other sectors (Guerrero, Nauditt, Robles, Ribbe & Meza, 2020). This means that farmers with the ability to use electricity-based irrigation facilities find it difficult to harness groundwater.

Hydrological drought is associated with both negative and positive impacts regarding the readiness and recovery of smallholder farmers. The negative implications are that hydrological systems link regions, and the occurrence of drought in the upper stream may consequently impact water levels downstream as the main source of water supplies are impacted, even when the downstream areas may not be experiencing any drought (Guerrero, Nauditt, Robles, Ribbe & Meza, 2020). The positive aspect in terms of drought readiness and recovery efforts by smallholder farmers is that the shortage of water in different water sources helps smallholder farmers innovate ways to employ appropriate water management and conservation techniques that will help them cope with future water crises.

2.2.3.3 Agricultural drought

Loon (2015) defines agricultural drought as a shortage of soil moisture content mostly in the root zone of vegetation, hence reducing the supply of moisture to vegetation in a specific area. Loon (2015) further explains that agricultural drought is also known as soil moisture drought because it is strongly linked to and tied to soil moisture levels that support vegetation growth, and a lack of soil moisture has adverse

impacts on natural ecosystems and infrastructure. Separately, FAO (2019) describes agricultural drought as a situation when the amount of soil moisture is barely sufficient to support and sustain vegetation growth. Agricultural drought reflects the degree to which soil moisture is relatively lower than the minimum water required by vegetation, and this is achieved by analysing features of soil moisture and plant morphology, especially at the growth stage (Liu, Pan, Zhu & Li, 2016). Liu et al. (2016) further explain that since agricultural drought is largely associated with a lack of water in vegetation as a result of a decrease in soil moisture, a reduction in soil moisture is mainly caused by a decrease in rainfall. Because of high transpiration, vegetation is not able to meet the basic water needs to ensure smooth plant activities, and therefore crop growth is interrupted, resulting in a reduction in mass crop production or even a worse scenario of severe crop failure (Liu et al., 2016). Smallholder farmers can prepare for such scenarios by employing appropriate readiness measures. In addition, soil moisture is a key factor in the reaction of vegetation to water balance, and the influence of water balance on vegetation plays a vital role in the entire water cycle (Liu, Pan, Zhu & Li, 2016).

Agricultural drought has both negative and positive consequences for smallholder farmers' readiness and recovery. In most cases, agricultural drought generates 80% of economic losses in poor nations and has a detrimental influence on agricultural sustainability by diminishing social stability, affecting food security, and depleting economic resources (Matlou, Bahta, Sekyere & Jordaan, 2021). The occurrence of agricultural droughts is also vital to smallholder farmers in Africa, as their projections by early warning systems assist in ensuring that farmers consider the employment of effective drought readiness and recovery mechanisms (Matlou, Bahta, Sekyere & Jordaan, 2021). Frequent experiences and lessons learned by smallholder farmers on agricultural droughts help in employing the appropriate measures in managing this particular drought.

2.2.3.4 Socio-economic drought

Loon (2015) explained that socio-economic drought is mainly associated with the effects of the three types of droughts discussed by several scholars above. It is also defined as the failure of various water resource systems to meet water demands, therefore negatively impacting social, environmental, and economic aspects of life. As the world population and large industry continue to grow, water demand rises; hence, socio-economic droughts become a serious threat in the majority of regions across the world (Loon, 2015). Semi-arid and arid parts of the world are predominantly susceptible to climatic variation and have adverse impacts on water availability and distribution (Zhao et al., 2019). This type of drought negatively impacts

smallholder farmers in efforts of preparation, response, and recovery because it is associated with impacts cross-cutting socially, environmentally, and economically. This occurs mostly when demand for certain economic goods and services exceeds supply due to a weather-related deficit in the water supply. On the bright side, the occurrence of this drought allows smallholder farmers to appropriately prepare financially, implement appropriate water conservation practices, and develop livestock food reserves (Liu, Shi, & Sivakumar, 2020).

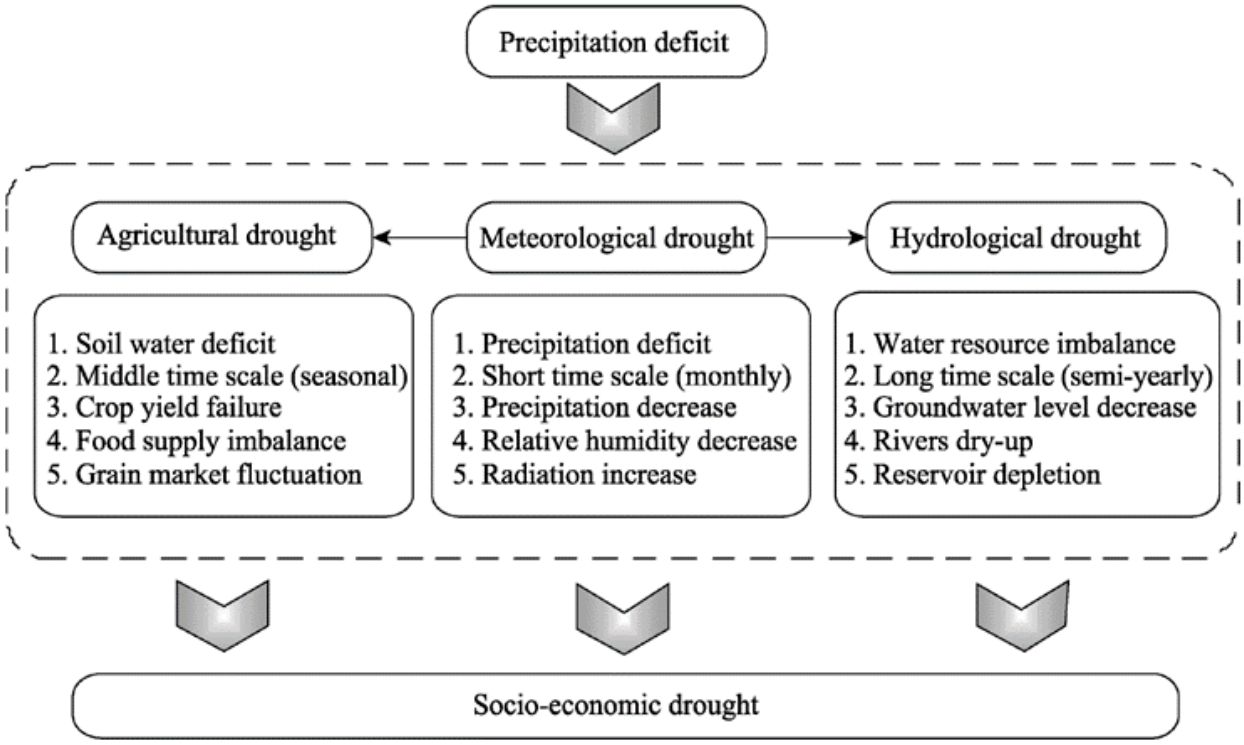

Figure 3: Drought transfer processes and interactions
Source: (Liu et al., 2016)

Liu et al. (2016) explain the drought transfer processes and interactions that exist among the various types of droughts. These interactions leads to several impacts that impact agricultural farming by smallholder farmers, whereby they are expected to cope with this impact by employing appropriate drought readiness and recovery measures. Figure 3 shows that agricultural, meteorological, and hydrological droughts are all triggered by a deficit in rainfall, which is further explained as below-normal precipitation that has been recorded over a certain period of time. A combination of all these kinds of droughts leads to a socio-economic drought. Every drought is associated with its impacts, which impact agricultural production by smallholder farmers. The agricultural drought is associated with a soil moisture deficit as poor rainfall is

received, and therefore this slows down the growth of crops, resulting in crop yield losses. The loss of crop yield impacts and disrupts the food supply chain and consequently leads to grain market fluctuation, which is linked to price fluctuation. Meteorological drought is associated with impacts that stretch from deficit precipitation and consequently reduce rainfall. A reduction in rainfall is a concern for smallholder farmers, especially those that entirely rely on rainfall for agricultural production. Hydrological drought leads to water imbalances in water catchment areas, which in turn decreases groundwater levels as they are not sufficiently recharged by precipitation (Loon, 2015). Inflows into water catchment areas reduce which may lead to rivers and other water sources drying up. All impacts that emanate from all kinds of droughts form part of the socio-economic impacts that generally constrain the ability of smallholder farmers to prepare and recover accordingly to a drought phenomenon.

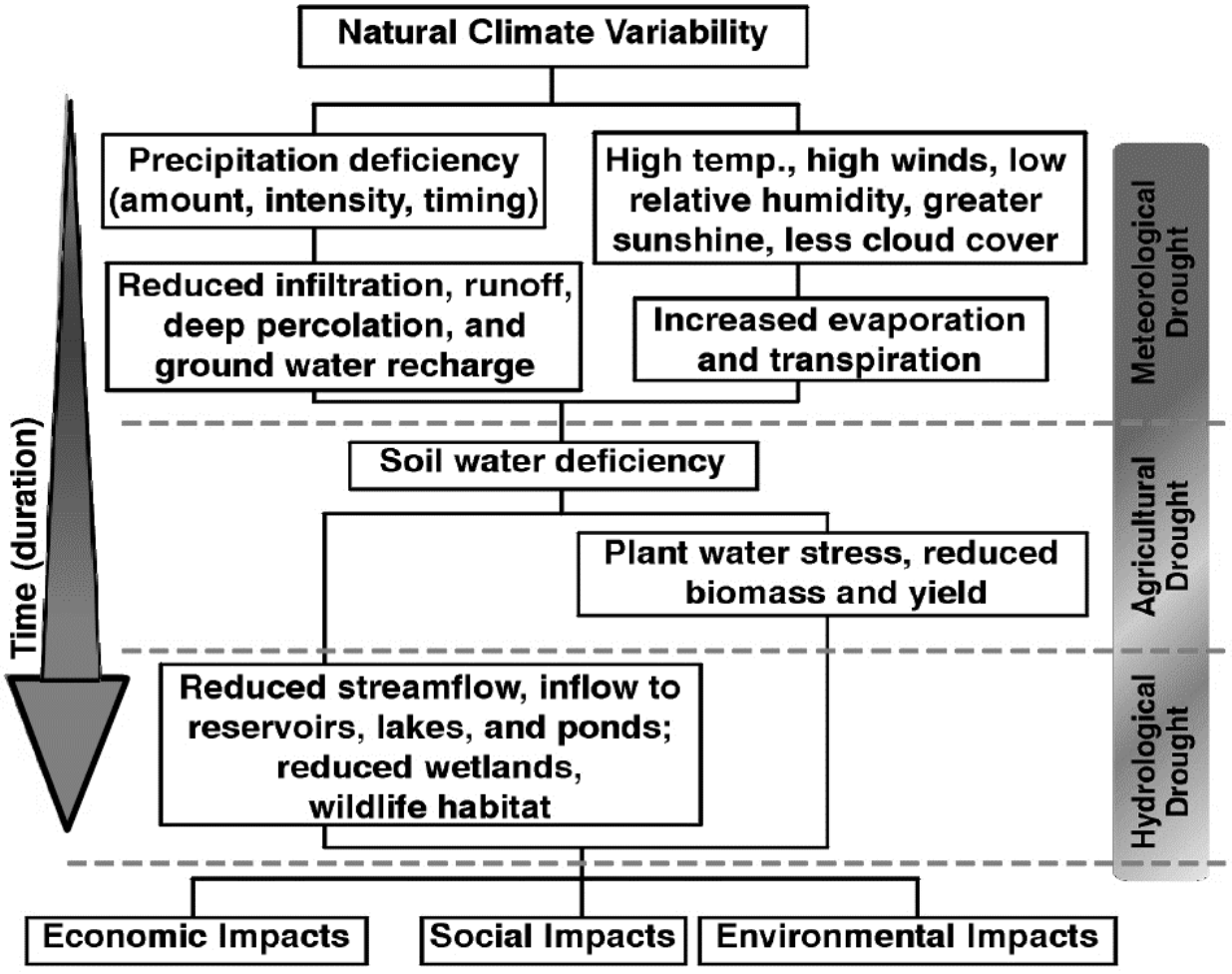

Figure 4: Evolution of drought types

Source: (Wilhite, 2011)

Figures 3 and 4 illustrate the progression of drought and the relationship between the three types of droughts, namely, meteorological, agricultural, and hydrological droughts. Mtetwa (2018) describes socio-economic drought as a drought that is categorised according to social, and economic effects, as discussed under the types of drought. As displayed by Figure 4, economic, social and environmental impacts are presented at the lower bottom, while the independent timescale indicates that such impacts as stated above can happen at any given stage during a drought event. Wilhite (2011) explained that when rainfall decreases, meteorological drought occurs first among other types of droughts, followed by agricultural drought and hydrological drought, which slowly occur as continuous evaporation of water is experienced. Wilhite (2011) further emphasised that socio-economic droughts are activated when agricultural and hydrological droughts develop to a certain stage. However, Liu et al. (2016) gave a simple understanding of the association and linkage between all types of droughts. Agricultural and hydrological drought basically refers to the effects of meteorological drought on agriculture and the hydrological system separately, while socio-economic drought is the result of the effect of meteorological drought on the socio-economic system.

All kinds of droughts are associated with several economic, social, and environmental impacts on agricultural productivity and the livelihoods of smallholder farmers. They impact the ability of these farmers to employ appropriate drought readiness and recovery efforts during droughts. Drought has serious consequences for the economy of a country as a whole, and particularly the socio-economic and environmental livelihoods of agricultural communities (Marie & Li, 2022). In addition to the economy and people, drought also affects the environment, as plants and animals depend on water just as people do. Therefore, understanding drought conditions, societal vulnerability, and their effects on one another provides us with lessons that can aid in dealing with recurrent drought conditions.

2.2.4 Trends in global droughts

Globally, drought is described as a lengthy spell of dry periods in the natural climate sequence that can occur anywhere in the world at any given time (World Health Organisation [WHO], 2021). Drought is a slow disaster that is normally associated with a lack of rainfall, resulting in a water shortage, therefore posing a serious threat to health, agriculture, economies, energy, and the general environment (Mangadi, Juana, Makepe & Narayana, 2014). The WHO (2021) estimates that about 55 million people around the

world are affected by drought every year, and it is a serious hazard to the agriculture sector. Furthermore, drought endangers people's livelihoods and increases the risk of disease, death rate, and migration. Zarafshani et al. (2016) state that a lack of water impacts about 40 percent of the global population, and 700 million people are at high risk of being displaced as a result of drought by the year 2030, as rising atmospheric temperatures caused by climate change are worsening situations by making already dry parts of the world drier and wet parts wetter. Zarafshani et al. (2016) further added that in dry parts of the world, this means that a rapid rise in temperatures is associated with high water evaporation, and hence increases the chances of drought that may prolong for lengthy periods. The WHO (2021) further highlighted that between 80 and 90 percent of all documented natural disasters during the past 10 years resulted from flash floods, prolonged droughts, tropical cyclones, severe heat waves, and storms.

The Cybersecurity and Infrastructure Security Agency [CISA] (2021) stated that drought affects many sectors of the economy, with economic impacts extending beyond the region facing the physical drought. The impacts associated with drought are categorised in two ways: (1) the direct economic impacts that are linked to industries such as agriculture, energy, tourism, forestry, and fishing sector (CISA, 2021). On the other hand, the indirect economic impacts of drought comprise loss of employment, entity failures, loss of investments, economic insecurity, and high inflation rates. CISA (2021) emphasised that drought readiness and recovery efforts by communal farmers and institutions basically require a detailed risk management approach that will safeguard the economy of the region from internal and external shocks, infrastructure, public health, agriculture, and the energy sectors. The aim is to plan better for drought resilience by establishing and promoting proactive relationships that exist between water, energy, and other key infrastructures (Aghelpour, Mohammadi, Biazar, Kisi & Sourmirinezhad, 2020). It is a concern that most governments are not investing in early warning information systems that help in the better management of reoccurring droughts (CISA, 2021). These systems assist in the better planning and application of appropriate readiness, response, and recovery mechanisms. This way, countries will not divert large funds to the reactive drought management approaches that the literature is describing as unsustainable in the long term.

Figure 5 clearly illustrates that south-western Australia, parts of southern Australia, the Amazon, the Mediterranean, and Namibia are expected to experience more frequent and intense droughts in the future as climate patterns are shifting across the world (Micu, 2020). Furthermore, at the same time,

Central Europe and the boreal forest zone are expected to receive above-normal rainfall. Central Europe will become wetter and is further expected to experience fewer droughts, but the droughts they will get are estimated to be much more intense.

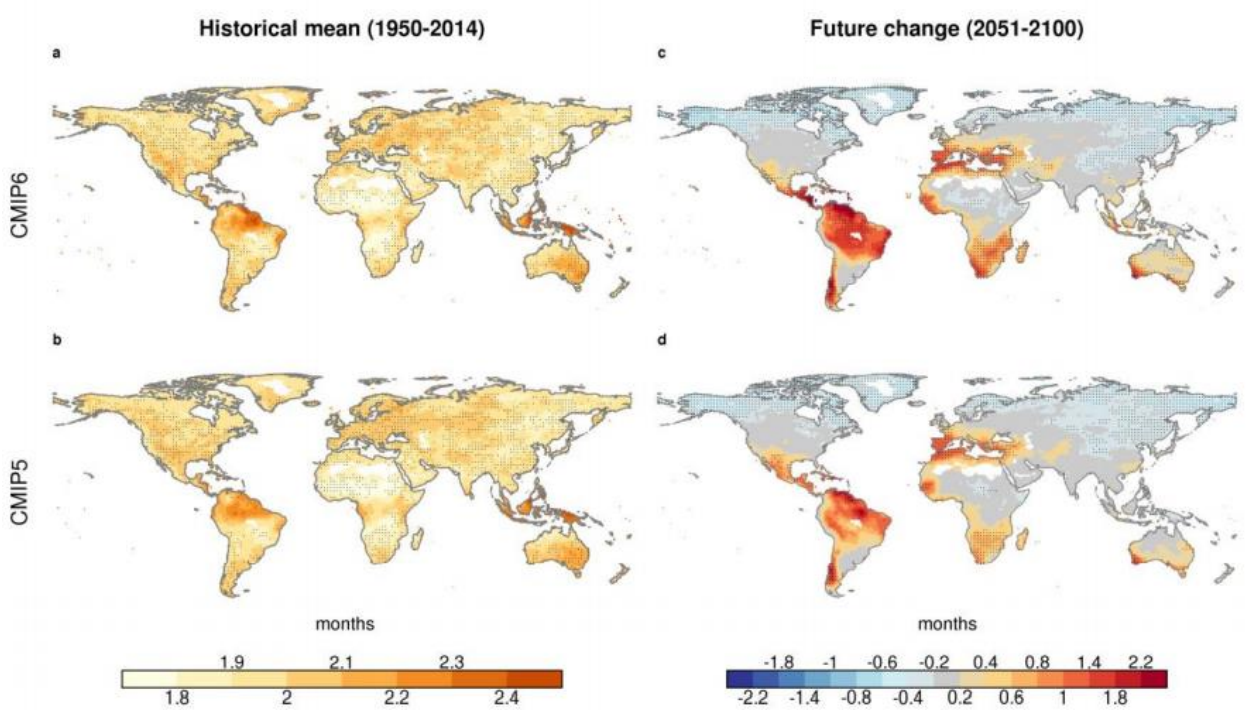

Figure 5: Projected variations in drought
Source: (Micu, 2020)

Micu (2020) highlighted that the duration of drought is closely linked to changes in normal rainfall patterns, but the intensity of drought is associated with the interaction between the normal rainfall pattern and its variability. In simple terms, regions that will experience the worst drought are those that will receive minimal precipitation and change their rainfall patterns throughout the year. Moreover, as displayed in Figure 6, the Mediterranean, Central America, and Amazon are projected to experience a decline in normal rainfall patterns, and they are likely to experience more regular and extended droughts. Figure 6 further displays that the boreal forests are likely to experience shorter droughts as average rainfall increases, but there is no region that is likely to experience a reduction in future drought intensity, not even in parts of the world where rainfall is expected to increase, such as Central Europe (Micu, 2020).

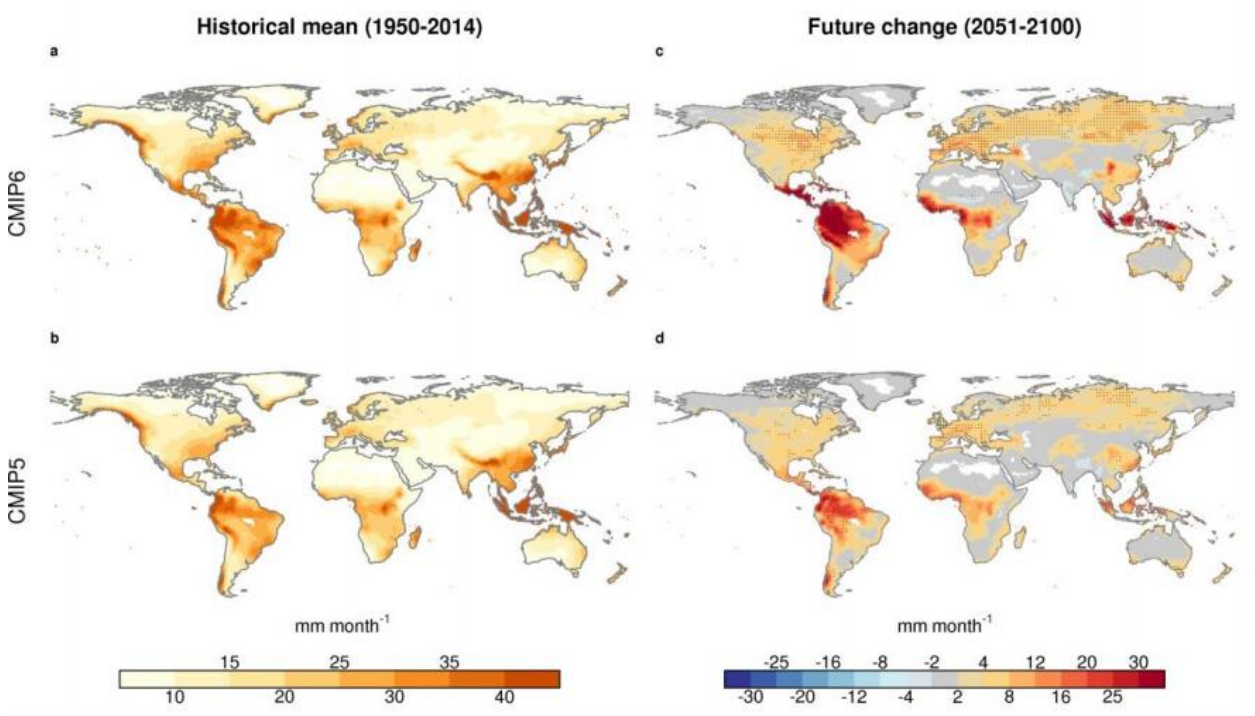

Figure 6: Projected variations in drought intensity associated to rainfall pattern
Source: (Micu, 2020)

Xu, Chen and Zhang (2018) urged that a deviation in meteorological and agricultural droughts is more common, with plenty of negative alterations towards aridity in these two types of droughts. This may be attributed to increased evaporation as a result of temperature increases. Moreover, despite the rise in rainfall in the Northern Hemisphere, meteorological and agricultural droughts are likely to increase in duration and frequency in northern America and Europe. In the Southern Hemisphere, the duration and frequency of all types of droughts are likely to increase, such as in South America, Southern Africa, and Australia (Xu et al., 2018). Sheffield et al. (2014) concluded by explaining that forecasting future variations of droughts is a challenge in climate science, but with the development of state-of-the-art models, it is easier to make predictions about future variations and impacts allied to droughts.

2.2.5 Drought trends in Africa

The majority of African countries have been susceptible to drought, mainly instigated by unfavourable weather and climatic patterns, which have a severe impact on rural households and agricultural production (Ngcamu & Chari, 2020). Moreover, Africans living below the international poverty line have

been suffering from growing malnutrition and hunger and have witnessed food insecurity at an unprecedented rate. Ngcamu and Chari (2020) further emphasised that, as a result, food scarcity has been strongly linked to a number of issues. These issues include prolonged drought conditions, undesirable weather patterns, political instabilities, economic uncertainty, diseases such as HIV/AIDS and the COVID-19 pandemic, and unfavourable government policies. Assoumana, Ndiaye, Puije, Diourte and Gaiser (2016) reinforced the views of Ngcamu and Chari (2020) on poverty in Africa, that a large fraction of the African population is already overwhelmed by chronic hunger and malnutrition and by persistent droughts.

In Africa, drought has a severe impact on rural households and overall livelihoods (Ngcamu & Chari, 2020). In addition to that, the rural poor community in Africa heavily relies on semi-subsistence farming for survival. This type of farming is vulnerable to changes in weather conditions. Fasemore (2020) described that the African agricultural sector is generally affected by the adverse effects of climate change, with the highest number of rural inhabitants prone to chronic hunger and malnutrition. On the same view, Mtetwa (2018) added that the severity of poverty limits the ability of the vulnerable and affected community to adapt to the adverse effects of drought, and as a result, poor rural families in Africa are facing daily socio-economic hardships.

There are a number of serious cases of extreme hunger in Africa caused by prolonged drought events. According to the World Food Programme [WFP] (2023), the humanitarian catastrophe in some parts of Africa continues to expand as a result of five straight years where rainfall was recorded below-average. The drought's adverse effect on food and nutrition security has been severe, especially when paired with the peace instability and financial uncertainty of African nations. Because of the drought, nearly 22 million people in countries such as Ethiopia, Kenya, and Somalia are food insecure. Malnutrition remains a serious concern. WFP (2023) projects that in 2023, 5.1 million children in three drought-affected nations will be severely malnourished, with serious consequences for their livelihoods.

In Africa, it is known that social protection programmes emanate from social security systems such as aid in the form of food and food-for-work. These programmes were designed to address the issue of food insecurity affecting communities in rural areas, where they were meant to uplift vulnerable smallholder

farmers (Devereux, 2012). Food security can be promoted by increasing food supply or food access. Devereux (2012) emphasised that these programmes should also focus on ensuring that food, particularly a well-balanced diet that addresses nutritional needs, is readily available and accessible to those intended to benefit, and this can be achieved by employing sustainable insurance mechanisms.

Devereux (2012) highlighted that innovative components linked to national social protection programmes, such as employment creation schemes, have the potential to address food security for all needy communities. Several challenges still exist in recognising the full potential and objectives of these programmes through their implementation in Africa. Devereux (2012) explains that the majority of African countries implemented these programmes because of the advocacy of donor funders. Donors availed themselves of financial and technical support, while minimal financial support is provided by the central government. Devereux (2012) further explained that many African countries are still wary about the concept of these programmes, as they still believe that they are financially unaffordable in the long run and not sustainable with a fear of dependency. Sustainable graduation of these programmes has been noted as one of the issues that has not been convincingly realised in Africa to date. On the other hand, the mismanagement of public funds, either through corruption or misappropriation of funds, is one of the challenges preventing the full realisation of social protection programmes. To address this, there is a need to improve through periodic monitoring while striving for good governance in most African countries.

Table 2: Number of droughts and associated impacts across the world as from 1900-2013

Continent	# of events	# of people killed	# of people affected	Damage ($\times 10^3$ USD)
Africa	291	847 143	362 225 799	2 920 593
Americas	134	77	69 505 391	50 471 139
Asia	153	9 663 389	1 707 836 029	44 251 865
Europe	42	1 200 002	15 488 769	25 481 309
Oceania	22	660	8 034 019	12 303 000
Total	642	11 711 271	2 163 090 007	135 427 906

Source: (EM-DAT, 2014)

Based on the data in Table 2, between 1900 and 2013, a total of 642 drought events were recorded around the world. These events impacted humanity, resulting in approximately 12 million human deaths and affecting over 2 billion people (EM-DAT, 2014). However, the total economic costs associated with it are valued at USD 135 billion. This negatively impacts and delays all prospects of recovery for nations and

smallholder farmers, as significant funding is diverted to rebuilding the socio-economic damage as a result of the drought. Drought has been and continues to be a serious disaster in Africa. Drought has also been an issue at the global level, henceforth creating vast destruction to humankind, the economy, and the environment, despite significant progress in monitoring and evaluation, predicting, and mitigating droughts (Masih, Trambauer & Maskey, 2014).

Moreover, the majority of African countries lack sufficient capacity (financial and technical support) to effectively address drought events. Carrão, Naumann and Barbosa (2016) explained that in developing countries, past attempts and future efforts to manage drought disasters have been ineffective, and impacts linked to socio-economic impacts have been on a sharp increase. This is mainly resulting from the already compromised existing infrastructure and institutions that are directly involved in disaster risk management. Drought events are associated with long-term socio-economic impacts and are regarded as the most damaging of all natural disasters.

Figure 7 shows that the northern part of Africa receives minimal and low rainfall, as it has a desert-related climate (Masih et al., 2014).

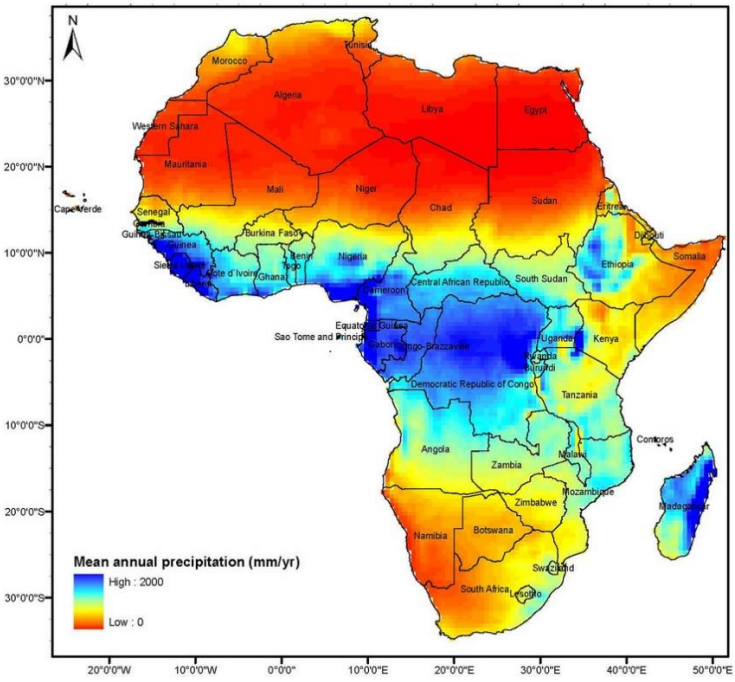

Figure 7: African continent and rainfall patterns (period: 1979-2010)
Source: (Masih et al., 2014)

Figure 7 further displays that the highest annual rainfall is typically recorded in central African countries and a few countries lining West Africa's west coast during the period represented, and these countries are characterised by sub-humid climatic conditions (Twumasi et al., 2020). In addition to that, the highest temporal variability in rainfall pattern is found across most of the countries associated with a semi-arid climate within western, eastern, and southern Africa. Rainfall variations within every country are notable. For instance, the eastern part of Ethiopia receives less rainfall compared to the western part (Masih et al., 2014). The southern part of Africa receives annual rainfall during October–March; the Sahel part's rainfall is received during July–August; and north-western Africa receives the majority of rainfall during October–April (Twumasi et al., 2020).

Masih et al. (2014) explained that the climatic condition of most parts of Africa experiences a large geospatial and temporal inconsistency. Additionally, drought vulnerability will always be high because of poverty and dependency on rainfall for agriculture. Data on drought events in Africa obtained from EM-DAT (2014) shows that Africa is likely to face intense and widespread droughts in the near future due to its fast-growing populations, increasing demand for water resources, and extreme land degradation of environmental resources. Masih et al. (2014) concluded that for African countries to be able to address such a daunting and heavy task, there should be a robust, shared, and well-coordinated effort. This effort should have dedicated and timely actions from various sectors, such as societies, government institutions, regional bodies, international organisations, and donors.

2.2.6 The impact of drought in developing countries

Rembold, Kerdiles, Lemoine and Perez-Hoyos (2016) observed that drought poses severe economic, environmental, and social impacts, which obviously have direct and indirect impacts in a short and long-term period. Brüntrup and Tsegai (2017) explained that drought is a natural disaster, but a change in climatic condition is aggravated by the severity of drought, drought frequency, drought duration, and drought extent. On that note, Brüntrup and Tsegai (2017) further indicated that the impacts of droughts are intensely worsened by human-induced activities such as deforestation, overgrazing of grazing pastures, land degradation, and mismanagement of water resources. Several empirical studies were carried out with the key aim of determining the impact of drought in several developing countries.

Murendo, Keil and Zeller (2011) investigated the effects of drought, drought risk management, and drought resilience in Ethiopia's Awash River Basin. The specific study discovered that harsh drought periods contributed significantly to crop production reductions and widespread livestock mortalities in the past. Study findings further show that drought periods caused food insecurity at the household level and prolonged the extent of food insecurity in the affected area. This was mainly triggered by the unreadiness of the communities to deal with these extremely unfavourable conditions, and thus the gap that this study needs to bridge.

In a separate case, a case study was conducted by Farrell, Trotman and Cox (2010) that investigated drought early warning and risk reduction in the Caribbean which was affected by drought during 2009/10. The study discovered that the most sensitive key economic sector, which is agriculture, has been severely impacted by the 2009/10 drought, and low drought resilience was observed. This low resilience is a result of limited capacity within key strategic sectors at the national and regional levels. Limited systemic information channel sharing and effective coordination between key stakeholders, inadequate policies and legislation, and limited finances to fully implement and sustain key sectors were among other key challenges of low resilience (Farrell et al., 2010).

A separate study assessed smallholder farmers' and rural communities' views pertaining to drought; it further investigated the adverse environmental, social, and economic impacts (Lottering, Mafongoya & Lottering, 2020). Besides the impacts, the study further assessed all adaptive and mitigation measures employed by smallholder farmers at the household level. This study further determined their level of satisfaction with the role that the government plays in the management of drought. Study results indicate an increase in poverty, food shortages, and frequent migration were the key impacts raised by respondents. Environmental impacts noted by the study range from lack of water to the death of vegetation, degradation of woodlands, and a fluctuation in average daily temperatures.

A policy research working paper produced by Pape and Wollburg (2019) extensively focused on the impact of the 2016/17 drought event on poverty in Somalia. This country had four consecutive seasons of poor rain between April 2016 and December 2017. The study found that drought worsened the already existing food insecurity, as the majority of the population was faced with severe food insecurity in mid-2017 and

many livelihoods were threatened. The study also found that there was a lack of water, deteriorated grazing pasture, high livestock mortalities, and low livestock birth rates, and that 26 percent of Somalis who rely on livestock for a living lost approximately 75 percent of their livestock herds. The study findings further revealed that the majority of Somalian households' food reserves were heavily depleted, and the agricultural sector weakened drastically. As a result, the drought forcefully displaced about 1 million people between 2016 and 2017, while humanitarian organisations promptly provided drought relief assistance to about 3 million people to cut the risk of famine (Bird, Clercq & Lorenzo, 2019).

In the majority of developing African countries and in Central America, the United Nations and other international agencies have strongly sustained drought relief activities, and many countries have developed disaster risk reduction institutions in accordance with the guideline framework of the United Nations (Brüntrup & Tsegai, 2017). Humanitarian aid assistance from donors is way more common, especially in African states; however, this sort of emergency relief has proven to address the present needs. Unfortunately, humanitarian aid is not sustainable in the long run since funding will still be required to react to future droughts. The best way to cope with future natural disasters is to invest in smallholder farmers' readiness support systems, like early warning information systems. Drought response normally strives to ensure that immediate relief is rolled out to the affected communities, and this has been the norm and continues to be an imperative way to overcome the effects of droughts (FAO, 2019). Even though drought relief is commonly employed in most African countries, this approach is deemed unfit to sustain smallholder farmers in the long run but rather to solve present problems.

In a separate case, Uhe et al. (2017) assessed the contributing drivers of the 2016/17 drought that hit Kenya, whereby parts of Kenya suffered the effects of low rainfall combined with scorching heat and high temperatures at the start of 2017. The study findings revealed the worsening of food insecurity at the national level; the agriculture sector was negatively impacted, and about 3 million people in Kenya were in desperate need of food aid as the Kenyan government declared drought a national emergency.

The growing African population is another factor in the worsening of drought vulnerability and repercussions in Africa. This has tremendous consequences when combined with poverty and ineffective governing policies. An expansion in the population puts additional strain on vulnerable land resources,

leading to unsustainable resource exploitation and environmental harm. In most cases, if crop production fails, subsistence farmers are mostly left with few to no other options for feeding their families. When they have no other options, the poor are forced to utilise land resources, in particular the vulnerable, with the aim of survival, and they ultimately become both victims and perpetrators of environmental deterioration and desertification. This way, it adds pressure and weakens efforts that are delivered by existing local infrastructure and institutions.

2.2.7 Drought management and response in developing countries

Wilhite (2011) explained that even though drought is perceived by many as a normal and recurring feature of the climate, minimal advancement has been made in drought management and response in many parts of the world. Wilhite (2011) further explained that the majority of Sub-Saharan African countries have little experience with proactive drought planning, preferring instead a reactive approach in most cases. This has done little to mitigate the current and potential future drought impacts. On a separate note, Wilhite (2011) specified that in Southern Africa, only Botswana and South Africa have made significant progress in developing appropriate drought readiness and response approaches by implementing the necessary functional structures. FAO (2019) emphasised that a lack of emergency planning for drought events in most parts of developing regions is a result of limited financial resources, poor understanding of the impact of drought, and poor coordination among government ministries and agencies. FAO (2019) further highlighted three planning processes for sub-Saharan countries as part of the drought management and response contingency plan. The planning processes referred to lay more emphasis on risk management than crisis management and are grounded on three mechanisms: (1) monitoring and early warning; (2) vulnerability and impact assessment; and (3) mitigation and response. The concept emphasised in the planning process of the drought management and contingency plan presents a positive distinction in readiness and recovery since risk management is financially sustainable and will assist in building resilience. This gives smallholder farmers the ability to cope with future droughts of several intensities. Crisis management is a costly approach, but most African nations are adopting this kind of approach.

Developing countries, such as Brazil, have established a national disaster risk reduction system that consists of a drought response with clear and well-defined drought emergency regulations. These systems allow the affected population to receive drought assistance without having to go through lengthy

processes that may lead to delays and hinder the realisation of intended objectives (FAO, 2019). In the case of drought events, the main support is provided in the form of funds rolled out to the most affected population, the distribution of clean water, food parcels for people, and fodder for livestock consumption. In smaller countries that are coupled by monetary constraints, such as in the Caribbean and Africa, there is always a need for complementary support from international organisations of the United Nations and other related non-governmental organisations. Support is required from these organisations since they play important roles in supporting local populations suffering from the impacts of drought to appropriately cope (Wilhite, 2019). Henceforth, it is for that reason that drought management in all drought-prone countries must clearly shift from managing the drought to managing risk, and policymakers and natural resource managers must adopt more proactive approaches (Wilhite, 2019).

2.2.8 National drought policies in developing countries

Drought policies are necessary in all drought-prone countries across the world, especially in developing countries where the majority of their populations are predominantly vulnerable to drought (FAO, 2019). The aims of a national drought policy will, of course, differ from one country to the next, but will most likely reflect certain similar elements steered towards empowering vulnerable economic sectors to implement self-reliance techniques. A drought policy supports risk management and encourages the optimal use of natural resources, as well as the early recovery from drought, by taking steps that are consistent with national drought policy objectives (Wilhite, Sivakumar & Pulwarty, 2014).

Hassan (2013) specified that drought policies in drought-prone states must shift from a reactive to a proactive drought response that promotes self-reliance in dealing with drought and is an integral part of forecasting and decision-making processes. Policymakers across the world are able to learn from wide-ranging experiences in combating droughts in regions such as Africa, Asia, Latin America, Eastern Europe, and the Mediterranean (FAO, 2019). On March 11-15, 2013, a number of international communities consisting of several organisations, such as the World Meteorological Organisation, the United Nations Convention to Combat Desertification, the Food and Agriculture Organisation of the United Nations, other major United Nations organisations, and civil societies, organised a high-level meeting in Geneva, Switzerland. This meeting primarily focused on national drought policies by assisting emerging nations in the establishment and execution of national drought management policies (“High Level Meeting on National Drought Policy” [HMNDP], 2013). The high-level meeting was attended by 87 countries from

across the world to deliberate and recommend appropriate and feasible actions for more proactive drought policies across the world (HMNDP, 2013).

The HMNDP (2013) resolved that drought policies should comprise the following key components: i) encourage normal approaches to vulnerability and impact assessment; ii) plan and implement drought monitoring systems, early warning and information systems; iii) boost readiness and alleviation plans and programmes; and iv) plan and implement emergency and drought relief measures. The HMNDP (2013) further proposed that the three components be supported by cross-cutting policies that consist of the resulting supplementary components. These components are such as capacity building, appropriate coordination and cooperation with regional and international bodies, institutional development, knowledge management, financial aspects, technology, advanced research and innovation, responsiveness, and stakeholder contribution.

Strengthening the resilience of smallholder farmers will be achieved by acknowledging the transformations in information systems pertaining to drought monitoring and early warning within the framework of the central government authority. The implementation of modern knowledge and indigenous practices is likely to add value, uplift resilience, and implement planning and investment decisions that take into account the minimal reduction of consequences associated with drought impacts (FAO, 2019). Implementation of these key components has been challenging over the past few years because of a lack of adequate resources. Access to adequate resources, in terms of several institutions, human and technical capacity, and funds, is critically important. FAO (2019) further added that middle-income countries typically have some resources and just require technical and methodological assistance. Less developed countries, on the other hand, typically lack sufficient resources to establish and implement a national drought policy, which must be obtained internally or from foreign donors.

2.2.9 Adaptation to drought and building resilience in rural households

Elasha et al. (2014) define drought adaptation as a process of making appropriate adjustments in terms of natural, social, financial, physical, and human resources in response to the impact of drought or other expected climatic events and their effects or impacts. Climate variability and extreme events such as droughts continue to cause significant challenges to rural households, especially those that are less

resilient and less adapted (Asfaw, Maggio & Palma, 2018). Separately, Elasha et al. (2014) further explained that adaptations are a series of activities that represent a change in a few aspects of socio-economic livelihood that are directly related to reducing vulnerability to climatic variability that leads to drought. An interrelation exists between indigenous practices and modern technology in relation to drought adaptation and building resilience by smallholder farmers, and all these can be designed for complementarity towards achieving a common goal.

A study by Olaleye (2010) assessed the importance of indigenous drought coping knowledge to smallholder farmers in South Africa. Study results show that indigenous knowledge is still an important component of applicable agricultural practices for drought risk reduction and has contributed immensely to drought resilience. Another striking finding that emanates from this study is that the young generation engaged in communal farming largely rely on modern agricultural practices since the world is evolving and there is a need to promptly address food security, thus calling for the employment of modernised practices. This particular study recommends that indigenous and modern farming knowledge be profiled and published, as this will assist farmers in benchmarking and gaining skills and knowledge on effective agricultural practices. Local community leaders and farming organisations are urged to convey information pertaining to the benefits associated with employing indigenous and modern knowledge, as they complement each other better.

The United Nations (2017) states that it is important that, with all natural disasters that occur around the world, rural households in particular build resilience during non-drought periods. Drought interventions themselves must focus entirely on early response while taking into account several important factors. Duguma, Brüntrup and Tsegai (2017) further note that all drought-related interventions should include various readiness measures for the next drought cycle, which leads to the concept of drought cycle management. This cycle incorporates both proactive and reactive measures.

Drought recovery at the household level is mainly significant for building resilience and stability in rural households (Liu et al., 2019). Drought recovery is mainly challenging, especially for the most destitute families in communal areas living below the poverty line. These households are severely affected by the social and emotional impacts as compared to the less vulnerable families. Keshavarz, Karamia and

Vanclayb (2013) highlighted that the most vulnerable households normally experience the following economic and social waves: significant reduction of household income; lack of alternative source of income; rapid increase in work capacity; fight over water access and use; severe household food uncertainty and malnutrition; health impacts prompted by a lack of rich-nutrient food and limited access to health services; limited education; discriminatory drought relief assistance; and related stress. Vulnerable households face other issues such as rapid rural-urban migration, psychological problems, alternations in family plans like delaying matrimony, and household and community disharmony and disintegration. Furthermore, if the occurrence of droughts intensifies, households that experienced long drought recovery periods are on the verge and likely to experience a new drought incident before fully recovering, and thus they could suffer extreme livestock mortalities and crop failures (Liu et al., 2019).

2.3 Conceptual framework

2.3.1 Conceptual framework for drought management processes

A conceptual framework was established with the key aim of organising and addressing the relevant components necessary for assessing drought readiness, response, and recovery strategies in accordance with the existing literature review. This study mainly focused on three main components of drought management, which are as follows: drought readiness, drought interventions, and drought recovery. All these drought management strategies were originally proposed by Kelly and Khinmaun (2007), and they were later adapted by Hellmuth, Vaughan, Mason and Aalst (2011); Vogt et al. (2018); and Leeuw and Quiros (2007). The adapted conceptual framework has four components that focus on drought prevention, drought readiness, drought response, and drought recovery.

Hellmuth, Vaughan, Mason and Aalst (2011) emphasised that the disaster risk management cycle measures the risks involved, and this is achieved by analysing and evaluating all hazards that may be potential or in existence already. This cycle begins with the prevention aspect, which mainly focuses on preventing existing and new disaster risks, followed by readiness, which entails enhancing existing capacities that will enable households to effectively plan, intervene, and apply appropriate recovery strategies from the impacts of likely or imminent natural disasters. Response mainly focuses on actual interventions rolled out directly to communities to render disaster relief during natural disasters, while recovery will eventually restore and improve socio-economic livelihoods as aligned with the values of sustainable development. Hellmuth, Vaughan, Mason and Aalst (2011) highlighted that for these

strategies to be effective, they should be aligned to a full disaster risk governance that includes the full participation of institutions, clear legislation, effective strategies, concise plans, and ample legal frameworks that render the necessary guidance and coordination for the entire disaster risk management.

The disaster risk management cycle by Hellmuth, Vaughan, Mason and Aalst (2011) guided and assisted in the formulation of the conceptual framework of this study. This study adapted the conceptual framework from Kelly and Khinmaun (2007), which was amended and reworked to adequately address the objectives of this study. The amended framework, as per the illustrations in Figure 8, exhibits that this particular study focused on three areas, namely: readiness, intervention, and recovery, of the four areas indicated in the conceptual framework by Hellmuth, Vaughan, Mason and Aalst (2011) on the disaster risk management cycle, which followed the following approaches: prevention, readiness, response, and recovery. Notably, this particular study did not assess the aspect of drought prevention, as it resembled directly with readiness strategies, and hence this was treated as a unified category.

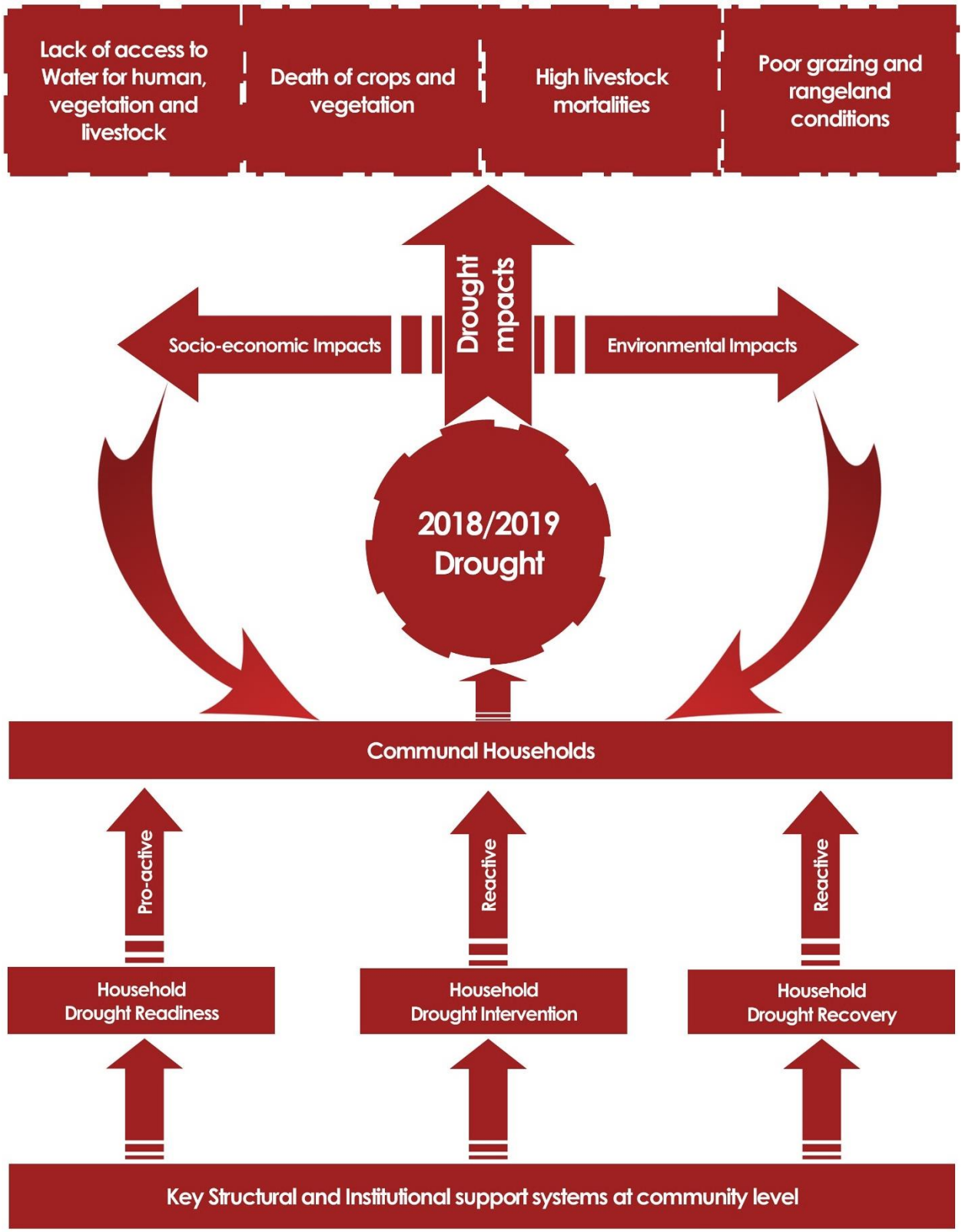

Figure 8: Conceptual framework on drought readiness, response, and recovery efforts of communal farmers

Source: Adapted from Hellmuth, Vaughan, Mason & Aalst (2011), amended and designed by the author (2022)

The conceptual framework in Figure 8 was adapted, amended, and re-designed accordingly by the researcher from the existing conceptual frameworks of several literature reviews to fit this particular study. It explains the key concepts, variables, and relationships that exist among those variables and how they were studied. Moreover, it simply builds up a set of structural ideas that are organised in such a way that they are able to achieve the study's objectives. The area of focus of this particular study was to assess the level of readiness, response, and recovery measures employed by communal farmers to effectively manage the impacts of the 2018/19 agricultural drought in northern communal areas of Namibia. Prior to the undertaking of this study, a review of the literature provided rich information on the national impacts of the drought in question; however, there was a need to fill existing gaps and further highlight the extent of these impacts on the study area, with the key aim of establishing and laying a strong study foundation.

As a means of scaling up the preparatory phase to the drought under review, it was expected that communal households employed drought readiness measures for livestock (livestock destocking, livestock relocation, livestock supplementary feeds, drought-resilient breeds, and early warning or advice) and crop production (drought-resistant crops, irrigation of crop fields, establishment of backyard gardens, dry or early planting, mixed cropping, mulching, weeding, seed density reduction, and early warning or advice). These measures were obviously based on the nature and reliability of early warning information received from existing early warning systems in the community. Duguma, Brüntrup and Tsegai (2017); and Wilhite (2019) strongly support the implementation of preparation strategies throughout non-drought periods as they lessen drought impacts through risk mitigation measures, vulnerability assessment, monitoring, and early warning.

The study adopted the approach in Figure 8 during the 2018/19 agricultural drought event. It was further expected that communal households, with the assistance of key role players under key structural and institutional support systems such as GRN (central government), Red Cross, World Food Programme (WFP), FAO, and UNICEF Namibia, were able to initiate and employ effective response measures (dietary reduction, food seeking, drought relief food parcels as emergency assistance, Utilisation of existing food reserves, and selling of household items to generate funds) to mitigate drought impacts at the household level. During the drought event, it was further expected from communal farmers to employ response measures (irrigation, backyard garden establishment, crop/vegetable windbreak, water conservation to effectively utilise the available water, soil erosion prevention, controlled litter disposal, and good tillage practices for minimal soil disturbances) that were geared towards guarding the loss of crops, preventing

soil disturbance, and managing available water resources by means of sustainable water management mechanisms.

The study further anticipated that communal households would implement response mechanisms (destocking, early weaning, herd separation, parasite control, feeds licks, supplement fodder, and establishment of new water points) that were reserved to lessen livestock mortalities in particular. As supported by Duguma, Brüntrup and Tsegai (2017), all drought intervention strategies are classified as reactive approaches, which are mainly implemented by most developing countries, especially in Africa, including Namibia, but they are discouraged by most authors as they create a dependency syndrome that instigates more harm and lacks the aspect of building resilience at the household level. Despite all this and after reviewing several of literature on drought response measures, this study highly expected communal households in drought response to employ such measures at the household level, while key role players rendered additional assistance and humanitarian aid.

As illustrated in the amended and adopted conceptual framework in Figure 8, communal households were highly expected to implement post-drought recovery measures that are geared towards building resilience, restoration, and stability in rural households. Expected recovery measures range from building livestock herds, debt repayment extensions from financial institutions, compensation by insurance companies, compensation by GRN, agricultural diversification, other emergency funds, the provision of sufficient water supplies, access to training on conservation agriculture, better crop management practices, and capacity building in communal households. Implementation of the above-mentioned strategies by communal households is categorised as reactive approaches, as there could have been minimal areas of recovery after the drought, if satisfactory preparation measures were achieved (Duguma, Brüntrup & Tsegai, 2017). In a nutshell, this is basically the concept adopted by this particular study and guided its full implementation.

2.3.2 Overview of the agriculture sector in Namibia

The agricultural sector in Namibia, with the exclusion of the fishing sector, has been contributing four percent to the country's GDP over the last five-year period (2015-2020) (International Trade Administration [ITA], 2020). Nevertheless, ITA (2020) further reports that livestock farming contributes roughly two-thirds of agricultural production, with crop farming together with forestry making up the remaining third of production. The Namibia Statistics Agency (2015) reports that meat processing, which

is accounted for by the Namibian government under manufacturing, contributes another 0.2-0.4 percent of the GDP. Despite agriculture's minor contribution to GDP, it continues to be important to a large portion of the population, directly or indirectly supporting the country's population and employing approximately 31,000 full-time workers (NAU, 2018).

Agriculture is classified into two diverse sub-sectors: the capital-intensive, reasonably well-developed and sophisticated, and export-oriented (commercial); and the subsistence-based, characterised by labour-intensive and low technology (communal). FAO (2021) reports that about 44 percent of Namibia's land covers the commercial sector, despite it accommodating only 10 percent of the population, while 41 percent of the total land area covers the communal sector, which accommodates about 60 percent of the population. However, agricultural production and farming income are relatively low in the communal sector for a number of reasons, ranging from limited access to markets to poor access to financial support (NAU, 2018).

Meatco (2019) reports that in the year 2019, Namibia exported about 12,400 metric tonnes of meat to the United States, Europe, South Africa, and China. On a similar note, Meatco (2019) further reported that livestock farming in Namibia remains an essential foreign exchange earner, and in March 2019, Namibia became the first and only African state to market beef to the United States of America. Apart from livestock production initiatives, the export of crop products has grown enormously by value in years, and the MAWLR has implemented two crop production initiatives: i) the Green Scheme and ii) the National Horticulture Development Initiative (NHDI). All these initiatives are aimed at maximising local agricultural production (ITA, 2020). The initiative on the green scheme basically promotes the establishment and production of agronomic crops on approximately 27,000 hectares of agricultural land along Namibia's perennial rivers bordering Namibia with other states. It is evident that the Green Scheme Initiative has not attained the majority of its initial set targets, whereby less than 9,000 hectares are currently under irrigation while several Green Scheme projects are struggling financially at the moment (ITA, 2020).

Schlettwein (2022), in his speech at the 2022 Annual General Staff Meeting, highlighted that the Ministry is aware of the limitations and challenges pertaining to agricultural production on Green Schemes projects across the country. It is for that reason that a mutually agreed-upon Cabinet decision was taken to

adequately operationalize green schemes that are not operating at an optimal level by adopting alternative modes of operation that will allow Namibia to unlock the potential offered by green schemes in line with the Second Harambee Prosperity Plan (HPP II). Schlettwein (2022) further emphasised that it is unfortunate that institutions in which green schemes function have yielded improved agricultural production for green schemes. As part of the Cabinet resolution, the government is exploring an agreeable approach that involves putting identified green scheme projects under public-private partnership models with the aim of stimulating private investment in the irrigation sub-sector as well as settling small-scale irrigation farmers.

Schlettwein (2023) in his speech at the 2023 Annual Staff and Stakeholder Address highlighted that the Namibian agricultural sector, including smallholder farmers, is committed to ensuring that the food insecurity caused by prolonged agricultural droughts is addressed collectively. This will ensure that small holderfarmers are well integrated into the agricultural mainstream and capacitated with appropriate preparation, response, and recovery to agricultural droughts. Schlettwein (2023) further highlighted that the three Green Schemes of Ndonga Linena; the Uvhungu Vhungu and Orange River Irrigation Projects, as well as the Uvhungu Vhungu Dairy Project were advertised for private sector participation in line with the expressed policy intent. The Ministry, with public funding support, has put these assets into production after being underutilised for many years. The Uvhungu Vhungu Dairy Project has recently been leased to a Namibian/Indian joint venture entity for a period of 25 years. Schlettwein (2023) further highlighted that green schemes such as Shadikongoro, the Sikondo and Etunda are not yet advertised, and they still remain with the Ministry; however, winter crops (wheat) have been planted and harvested at some of these schemes, and now summer crops (maize) are planted.

In his address, Schlettwein (2023) stated that the Ministry's projects that the 776 hectares will bring an average of 7,000 tonnes of white maize from the above-mentioned green schemes. This will eventually double the yield of maize realised from the Musese, Mashare, and Shitemo Green Schemes of 2022. If the target has been achieved, a yield of 14,000 metric tonnes, which excludes production from small and medium-scale farmers, will eventually overflow the current National Strategic Food Reserve, which currently stands at 11,000 metric tonnes.

ITA (2020) highlighted that the Ministry, specifically under the NHDI, aims at maximising local agricultural production and creating an enabling and conducive environment that involves the marketing of fruits, vegetables, livestock fodder, and other horticultural products. ITA (2020) added that a key component of the NHDI is an import replacement programme called the Namibian Market Share Promotion (NMSP). Briefly, NMSP stipulates that importers of fresh horticulture produce are required by law to procure a specific minimum percentage of their products from fully Namibian producers before qualifying for an import permit. Initially, the government, set the NMSP threshold at 5 percent back in 2005; nevertheless, the threshold has been growing, and it currently stands at 47 percent.

To further support the NHDI, the government, in line with Vision 2030 and the Green Scheme Policy, established Fresh Produce Business Hubs in key strategic areas of Ongwediva, Rundu, and Windhoek (Tinarwo, 2014). The role of these facilities is to offer a harmonised agricultural marketing (local and export) infrastructure for fresh produce in Namibia. The established hubs promote the processing and value addition of fresh produce within the agricultural value chain; hence, this contributes to employment creation within the Namibian agricultural sector (Tinarwo, 2014).

2.3.3 Drought history and trend in Namibia

Namibia is susceptible to natural disasters as the country has battled with flash floods and severe drought events in the past years, causing livestock mortalities and crop losses, increasing poverty, and threatening food insecurity (Awala, Hove, Wanga, Valombola & Mwandemele, 2019). The reoccurrence of drought in most parts of the country has become a common event, and therefore it has led to the formulation of the National Drought Policy and Strategy in 1997. However, the MAWLR is currently reviewing the existing National Drought Policy and Strategy of 1997 because of the establishment of the Drought Fund, which was never developed, though there are provisions in the policy. The Office of the Prime Minister established a National Disaster Fund that provides for all kinds of natural disasters in the country (Schlechter, 2016). Moreover, the policy assists in developing a competent, reasonable, and sustainable approach to the management of drought. It is worth noting that the revision of this policy is in a more progressive phase.

Shikangalah (2020) notes that Namibia recorded a number of drought periods over the past years, from 1980 to 1984, 1992/93, 2012/13, 2015/16 and 2018/19. Regarding past drought events, Shikangalah (2020) explains that the 1992/1993 agricultural drought was associated with below-average rainfall, while the 2012/13 drought was the worst experienced over the decade, as about 42 percent of the total Namibian population experienced food insecurity. Furthermore, the government declared a state of emergency and requested financial assistance from the international community. However, the El Niño-induced drought impacts in 2015/16 led the Namibian government to declare a state of emergency on the June 29, 2016, and an estimated 729,000 Namibians were in need of urgent drought relief assistance (SADC, 2016).

SADC (2016) further reports that the urgent crisis need was access to water, which mainly affected a massive fraction of the Namibian population was worsened by the El Niño-induced drought. As below-average rainfall was received, the country relied on groundwater sources to meet the demands of both the rural and urban populations (Kolusu et al., 2019). Moreover, water was made accessible to both humans and livestock in affected areas, and food relief assistance targeted mostly poor rural households that experienced food shortages. In the livestock marketing industry, the government made provision of an incentive programme aimed at encouraging farmers to destock with the aim of reducing pressure on the already deprived grazing conditions to avoid more livestock losses (Shikangalah, 2020). All these interventions were mainly reactive in the sense that they were geared towards addressing the immediate impacts with short-term solutions but were not sustainable in the long run. Sustainability would only be realised if smallholder farmers were capacitated with the key aim of being able to cope with future droughts. This way, it will reduce the financial strain.

2.3.4 The 2018/19 agricultural drought in Namibia

Namibia is one of the most susceptible countries to the effects associated with climate change because of the aridity of most parts of the country (Shikangalah, 2020). Furthermore, droughts resulting from variations in climatic conditions mostly drive the majority of inhabitants into poverty. In 2018/19, Namibia was hit by another overwhelming agricultural drought that affected nearly 556,000 Namibians (UNICEF, 2019). Drought was declared by the Namibian government through the MAWLR immediately after a food security assessment report revealed a significant reduction in crop harvest of at least 53 percent compared to the harvest for the previous season (UNICEF, 2019). In addition to that, a massive reduction

in crop harvest was largely attributed to the below-average rainfall received during the 2018/19 rainfall season. The MAWF (2019) reports that over 88,219 livestock mortalities were reported from October 2018 to September 2019 due to severe livestock malnutrition caused by the drought. Despite the drought response plan clearly aimed at protecting the livelihoods of farmers through market incentives to destock, this intervention was not fully implemented promptly since the funds earmarked for this particular response plan were not made available promptly (Office of the Prime Minister, 2019). According to Haraseb (2022), another factor that delayed the rolling out of market incentives is that a number of farmers did not have bank accounts where their incentives would have been deposited, while others did not want to adhere to the advice to reduce their livestock as early as possible to reduce such losses.

Considering household food security position in the country, the situation weakened, predominantly in the communal areas where the majority of households indicated to use up all remaining food reserves, following an unproductive agricultural season due to severe drought conditions of the 2018/19 rainfall season (MAWF, 2019). The majority of affected rural households were only dependent on the formal market to access food necessities, while other households relied on drought relief food assistance that was rolled out by the Namibian government to supplement their existing food supplies (Nakale, 2019). National and community markets were negatively affected by the drought since the availability of food in these markets largely depended on the production by smallholder farmers. Since there was little harvest, these communal farmers were hesitant to put most of their production on the market since they were not certain of the duration of the drought or what the immediate future holds. It is for that reason that food declined on the informal community markets, and buyers were reliant on the formal market instead to meet their daily food needs.

As Namibia was hit by the drought in 2018/19, the President declared the drought a natural disaster under the Disaster Risk Management Act 10, of 2012, Section 30, in order to mitigate the impact of the drought on the livelihoods of communal farmers. The president's directive compelled the implement of several drought interventions (OPM, 2019). Coordination of the drought response plan was spearheaded by the Office of the Prime Minister through the Disaster Risk Management Focal Point Persons Forum and NVRAC, led by the National Disaster Risk Management Committee at the national level (OPM, 2019).

Meanwhile, interventions at the regional level were coordinated by regional councils through the Disaster Risk Management Committee (Nakale, 2019). According to the 2018/19 National Drought Response Plan, a number of key sectors were mobilised to implement drought relief interventions. These sectors are as follows: Office of the Prime Minister-leader, Ministry of Agriculture, Water and Land Reform-core leader, Regional Councils, Traditional Authorities, Ministry of Environment, Forestry and Tourism, Ministry of Health and Social Services, Ministry of Urban and Rural Development, Namibia Red Cross Society, Ministry of Works and Transport, Ministry of Defence, Ministry of Fisheries and Marine Resources, Ministry of Education, Arts and Culture, Namibia Statistics Agency, Ministry of Information, Communication and Technology, and the United Nations, specifically the Food and Agriculture Organisation and WFP (OPM, 2019).

Namibia received funding to the tune of US$ 1 million as humanitarian emergency assistance from the African Development Bank to mitigate the effects of the 2018/19 drought (African Development Bank, 2019). The key objective of the emergency relief assistance was to complement efforts that were implemented by the GRN and other humanitarian associates to ease the impacts associated with the drought. However, funds were earmarked for providing immediate humanitarian support to affected communities and livestock. This was implemented by rolling out emergency food, farm inputs, livestock feeds, promoting water delivery, and conducting financial audit on the usage of such funds for accountability purposes in the efforts to curb corruption and misappropriation of such funds.

Table 3: Breakdown of the 2018/19 Drought Emergency Relief Assistance from the African Development Bank

No	Item Description and Category of Expenditure	Unit	Qty	Unit Cost (USD)	Total Cost (USD)
1	Procurement of Food Items - Emergency Food[1] Assistance (Drought Relief) - ***Goods***	Lot	1	350,000	**350,000**
2	Procurement of Certified Seeds, for next season - ***Goods***	Lot	1	99,500	**99,500**
3	Procurement of Lick Supplements for Livestock (Core Herd) - ***Goods***	Lot	1	230,000	**230,000**
4	Procurement of Livestock Feed (Fodder Subsidy) - ***Goods***	Lot	1	150,000	**150,000**
5	Support to Water Tanker Services (Water Distribution) – ***Operating Cost***	No	1	130,000	**130,000**
6	Operating Cost and Logistics – ***Operating Cost***	No	1	32,000	**32,000**
7	Audit Services - ***Services***	No	1	8,500	**8,500**
Total Cost (USD)					**1,000,000**

Source: (African Development Bank, 2019)

Legend: "Lot" means physical goods that will be procured and rendered, while **"No"** means services and operating costs that will be procured and rendered.

According to the World Food Programme [WFP] (2017), it is a worry that Namibia and other African states receive significant funding in the form of humanitarian aid and mobilisation of finances from offices, ministries and agencies within the central government. Minimal effort in terms of financial support is given to the development and investment of drought readiness, response, and recovery infrastructure, especially for smallholder farmers. The central government should move away from the concept of reacting to the impacts associated with droughts, as this has proved to be very costly and unsustainable in the long run (WFP, 2017). The aim of this concept is to shift the idea of drought management from the government to smallholder farmers, with minimal financial and drought relief support, as these interventions should merely be implemented when extreme drought is declared (WFP, 2017). To manage drought better, the GRN's involvement in drought events should stretch beyond focusing on humanitarian drought assistance to a longer-term perspective that is sustainable (WFP, 2017).

Meanwhile, drought relief interventions as per the 2018/19 National Drought Response Plan were employed nation-wide since the drought was declared a national emergency. Drought relief interventions range from rolling out food relief parcels to seriously drought-affected groups, livestock marketing incentives, leasing of grazing areas, introduction of transport subsidy to and from grazing areas, water

provision, rehabilitation of dilapidated boreholes and installation of new ones, subsidy on livestock fodder, and provision of quality seeds (OPM, 2019). However, interventions related to drought relief food were implemented by the Office of the Prime Minister's through the Directorate of Disaster Risk Management, while other interventions were fully implemented by the Ministry of Agriculture, Water, and Land Reform (Nakale, 2019).

2.3.5 Drought readiness and response structure in Namibia

Corbett (2020) defines organisational support institutions as a collective group of institutions that render a wide range of support. This support ranges from civic and political institutions with the aim of rendering access to a variety of services and public goods. Particularly, these institutions represent the interests of inhabitants in the community by improving livelihoods and creating several opportunities in a civic manner. Corbett (2020) further emphasised that these institutions that are present in communities range from local government institutions (education and health care). Local communities therefore plan for socio-economic growth through these institutions, manage livelihoods, provide education, offer social aspects of life to the youth, and ensure that public health and safety are delivered. Institutions of this calibre assist in creating a community that identifies and provides a conducive environment for various opportunities to flourish.

A sharp increase in the regularity and harshness of natural disasters forced Namibia to realise that an urgent and well-coordinated national approach was required to strengthen the country's capacity and ability to tolerate and recover from natural disasters (OPM, 2011). In order to meet the aforementioned policy obligation, a working group composed of experts from various sectors was formed to develop the National Disaster Risk Management Plan and Emergency Management Operational Actions (DRMA, 2012). The ultimate aim of developing the plan was to ensure national guidance on the aspect of disaster management for all levels of society involved with appropriate tools to regulate the management of disasters in key areas of prevention, readiness, response, and recovery operations (OPM, 2011).

Namibia's work towards readiness and response to natural disasters is regulated by the Disaster Risk Management Act 10 of 2012 (Disaster Risk Management Act 10 of 2012 [DRMA], 2012). The act calls for the establishment of disaster risk management institutions in Namibia that provide for a unified and

harmonised disaster management method that primarily lays emphasis on mitigating the risk associated with disasters, moderating the harshness of disasters, emergency readiness, prompt response, and post-recovery to disasters; making provision for declarations of disasters; making provision for the formation of the national disaster management risk fund; and making provision for other related matters (DRMA, 2012). Since the enactment of the DRMA 11 years ago, a number of achievements have been achieved so far, while acknowledging the challenges associated with its implementation.

Shaamhula (2021) stated that Namibia developed both the disaster risk management policy in 2009 as and the Disaster Risk Management Act of 2012. It is worth noting that all these policy-guiding documents guide the national response mechanism to all disasters, including drought. In these policy instruments, a national disaster risk management framework has been developed as the guiding framework that governs all responses at the national level in the event of natural disasters. A review regarding the implementation of these policy instruments shows that there are gaps in their implementation. Shaamhula (2021) highlighted the concerns that, firstly, all response measures at the national level have always been reactive in the past few years. Therefore, this is a concern about whether the possible risk reduction framework has the ability to help limit the risk of drought events in the long run. Another concern raised is that Namibia already has a national disaster risk management framework that takes into account a number of proactive approaches; however, all those involved in disaster risk management have been implementing reactive responses by means of humanitarian aid. It is important that the availability of the national disaster risk management framework shows Namibia's commitment and determination to create a long-term risk reduction strategy that will effectively address future natural disasters, including droughts (Shaamhula, 2021).

Namibia approved the National Disaster Risk Management Policy in 2009, with the goal of improving capacity to assist with early warning, pursuing, monitoring, and ensuring the timely dissemination of information on situations that promote disaster events (Office of the Prime Minister [OPM], 2017). The said policy focuses mostly on future directions for managing disasters based on attaining community and organisational resilience and encouraging better long-term solutions (Office of the Prime Minister [OPM], 2011). This policy was revised in 2017, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030. A National Disaster Management System strives to reduce double allocation of responsibilities as

well as to effectively and optimally utilise resources by facilitating the alignment of roles and responsibilities for disaster risk management (OPM, 2011).

Figure 9 shows a set of institutions and subcommittees directly involved in the administration, coordination, and implementation of the whole National Disaster Management System in Namibia. The National Disaster Risk Management Committee is Namibia's top decision-making level, which serves as the national platform in charge of disaster risk management. This committee is chaired by the secretary to cabinet, and it gives all sort of advises to the president and cabinet on the severity of the drought or any other natural disaster in the country through the office of the Prime Minister (Shaamhula, 2021). The Directorate of Disaster Risk Management is part and parcel of the Office of the Prime Minister, which is mandated to coordinate all natural disasters in Namibia. All 14 political regions in Namibia operates in accordance with the established national disaster risk management framework (NDRMF).

The NDRMF is expected to set up a Regional Disaster Risk Management Committee that gives appropriate advice to the Chief Regional Councillor on the issues pertaining to disaster risk management in that particular region (Shaamhula, 2021). The next level in the coordination of disaster risk management is the Constituency Disaster Risk Management Committee, which operates at the constituency level and advises the regional governor accordingly (Shaamhula, 2021). The Constituency Disaster Risk Management Committee is headed by the regional councillor, and it is expected to implement disaster risk management affairs. The key responsibility of this committee is to integrate all plans linked to disaster risk management into regional disaster plans and the development of constituency response and recovery plans (Shaamhula, 2021). The Settlement Disaster Risk Management Committee is the lowest body that coordinates natural disaster activities at the grass-roots level, which is the settlement. This committee obtains information from the headmen on the severity of the drought at a community level, and they are expected to report back to the particular constituency councillor (OPM, 2011). The Settlement Committee ensures that awareness is given to the local communities to fully recognise the importance of early warning information with the aim of employing appropriate drought readiness, response, and recovery efforts (OPM, 2011).

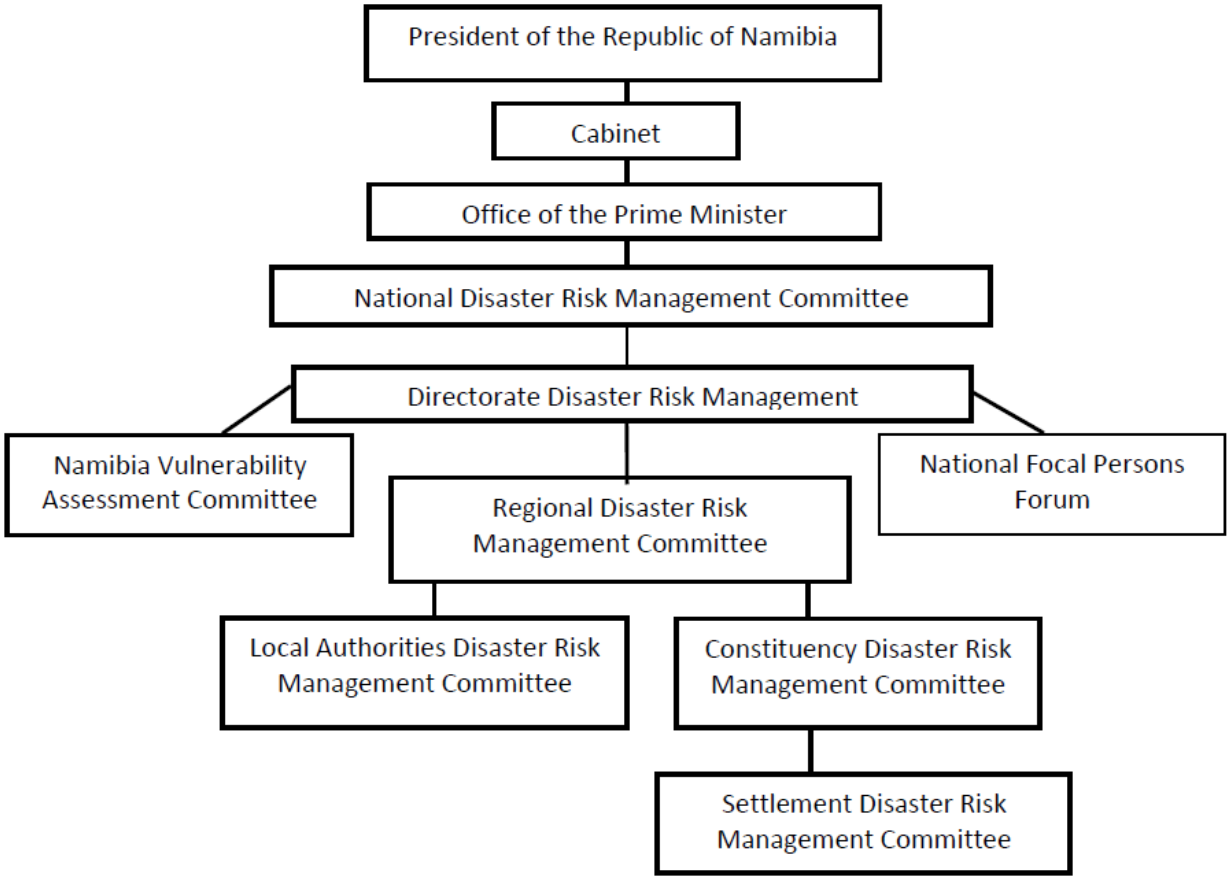

Figure 9: Institutional framework for Disaster Risk Management in Namibia

Source: (OPM, 2011)

2.3.6 Drought monitoring and early warning in Namibia

Dansie et al., (2017) cited that the key aim of drought early warning systems in the community is to caution community members of potential risks associated with natural disasters such as drought. They assist with community readiness and lessen all risks associated with crop and livestock losses. Dansie et al. (2017) further stated that early warning and other related technologies are key for the agricultural and water resource management sectors. Dansie et al. (2017) further emphasised that progressive warning systems require the use of drought monitoring with correct drought indicators, meteorological data and warning (climate and weather forecasts), public awareness on drought, institutional integration, and data sharing provisions. The rise in irregular climate patterns, such as the frequent occurrence of severe droughts, makes early warning systems an integral component of drought readiness in many countries. It is therefore vital that assessing all risks and associated vulnerabilities is likely to lessen threats and expensive drought relief measures after a drought.

OPM (2011) clarified that the Disaster Risk Management Plan defines an early warning-related system as a way to ensure that early warning related information about potential natural disasters is properly conveyed to the relevant communities and stakeholders. Apart from drought situations, early warning systems are usually important and applicable for other natural disasters that occur in the country, which may include flash floods, veld fires, and epidemics (Nakanyete, Shikangalah & Vatuva, 2020).

Kapolo (2014) emphasises that there is no single institution in Namibia that offers early warning-related information. However, everything involved in the early warning is actually mutually coordinated by a number of institutions, yet it depends on the type of natural disaster. At present, the MAWLR is largely involved in activities pertaining to the early warning system and drought monitoring-related events (Kapolo, 2014). Moreover, the Ministry houses the Early Warning and Food Information Unit from the Division of Agricultural, Land Policy Planning and Statistics within the Directorate of Planning and Business Development. Every financial year, the Ministry dispatches an early warning team to conduct an inclusive agricultural input and household food security assessment. This assessment provides early warning and food security information to key crop-producing areas of the country (Ministry of Agriculture, Water and Land Reform [MAWLR], 2021). The assessment normally consists of staff members from the MAWLR, Namibia Meteorological Services, and the Directorate of Disaster Risk Management from the Office of the Prime Minister. The team assesses and furnishes inclusive reports on the status of agronomic crops, livestock and pasture conditions, food security at the household level, water readiness, and geographical areas affected by drought (MAWLR, 2021).

Namibia Meteorological Services plays a key role in drought early warning by providing weather-associated forecasts and seasonal rainfall viewpoints (Kapolo, 2014). Persendt, Gomez and Zawar (2015) explained that the meteorological service monitors and provides systematic reports on rainfall patterns and other weather-related phenomena. The Ministry of Health and Social Services takes responsibility for human epidemic outbreaks such as COVID-19, drought monitoring, and takes responsibility for national nutritional observation. However, the Directorate of Disaster Risk Management has a comprehensive mandate to coordinate disaster risk management in Namibia (Kapolo, 2014). To supplement the reliability of local early warning systems, Namibia relies on data and information provided by the global and regional

early warning information systems. This kind of information is transmitted, and awareness is given to the nation, particularly the most vulnerable communities of smallholder farmers. To ensure that effective early warning systems prevail, Namibia should continuously build on regional efforts by developing a tailored national monitoring systems to strengthen drought risk management in the country. Namibia should continually uplift the work of national institutions in drought management by providing effective climate services.

It is important that the development and full implementation of effective early warning systems pertaining to drought events have the ability to improve the drought readiness, response, and recovery strategies of smallholder farmers (Moises & Kunguna, 2022). This will eventually strengthen the ability of smallholder farmers to cope with future droughts, and at the same time, this will minimise the risks associated with droughts. However, drawbacks such as the lack of reliable data and information on the functionalities of early warning systems, the technical and financial support required to fully operationalize these systems, and the undermining of the risk minimization measures implemented at the grass-roots level.

2.3.7 Drought vulnerability assessment in Namibia

Namibia's Vulnerability and Risk Assessment Committee (NVRAC) aims at developing a mutual understanding among stakeholders of the main hazards affecting the socio-economic livelihood of individuals (Hegga et al., 2016). Furthermore, this is done primarily to develop appropriate measures that reduce risk while improving wellbeing and promoting Namibians' resilience to natural disasters such as drought. In addition, NVRAC embarks on a complete review of the food and nutrition situation in the country. This helps in fully understanding existing food and nutrition security interrelated strategies in the country and recognising any deficiencies in the national approach. This also helps propose potential interventions in key areas to help Namibia achieve food security and better nutrition.

Namibia currently has a number of monitoring systems within the various structures of government ministries. However, cooperation has been lacking, and as a result, most of the information and data collected lacks uniformity, is not properly analysed, and is incorrectly presented, therefore affecting decision-making (OPM, 2019). In view of the above, a well-coordinated food security monitoring and

surveillance system will allow NVRAC to keep track of variations in the food and nutrition status of vulnerable populations. The system will generate suitable information that will influence and help decision-makers make informed decisions and policy formulations (Wilhite et al., 2014). Also, a well-structured and holistic food security monitoring system in Namibia will strengthen early warning, readiness, and response measures to natural disasters of all kinds (OPM, 2011).

2.4 Chapter summary

The chapter outlines the general concept and definition of drought and discusses challenges associated with no distinctive or accurate definition across all disciplines, but ideally, any drought definition should be aligned and linked to a specific region under investigation and applied to the particular application. The chapter also explained the types of drought and how they are interrelated by means of interaction and transfer processes, as cross-cutting issues exist. The chapter further emphasised global and African drought trends and how millions of livelihoods are affected across the globe every year. The chapter also covered the impact of drought in developing states while reviewing several national drought policies. Literature suggests that drought policies in drought-prone states must shift from a reactive to a proactive drought response to promote self-reliance in dealing with drought. A conceptual framework was developed and adopted from past literature reviews to assist and guide the undertaking of this study, and a history review on trends in droughts in Namibia was done. Key aspects ranging from the 2018/19 agricultural drought, drought readiness and response structure, drought early warning, and drought vulnerability assessment were extensively reviewed. The literature reviewed shows that the majority of African countries have been susceptible to drought. This had a severe impact on rural households and overall livelihoods, as the majority of African countries lack sufficient capacity to manage drought events. The reviewed literature concluded by highlighting the importance of drought readiness plans in developing countries such as Namibia. The benefits associated with capacitating communal households and strengthening adaptability and communities to build resilience against future droughts are also covered.

Chapter 3: Methodology

3.1 Introduction

This chapter provides a detailed description of the study area and several features pertaining to the employed research methodological approach. Moreover, the chapter discusses the sampling strategy, data collection methods and the data analytical approach employed by the study. The chapter also presents the ethical considerations considered, and ends with a conclusion.

3.2 Study area

3.2.1 Topographical location

The designated study area was the Eengolo settlement. This settlement is situated in the Omusati Region, approximately 13 kilometres alongside the national highway B1 road from Outapi towards the direction of Oshakati. The geographical coordinates for the settlement are 17° 36' 0" south, 15° 5' 0" east, and it is located in Outapi Constituency. Outapi is an electoral constituency in the Omusati Region of northern Namibia, with an area of 949.1 km^2 (Namibia Statistics Agency [NSA], 2011). It was established during the advanced stages of data collection that the settlement of Eengolo, which was the primary study area, has five and not six villages, namely: (i) Okahwa-Kangamba, (ii) Okathitu-Kakafimbi, (iii) Okahwa-Kangweva, (iv) Okapuku, and (v) Omaputa (Figure 10).

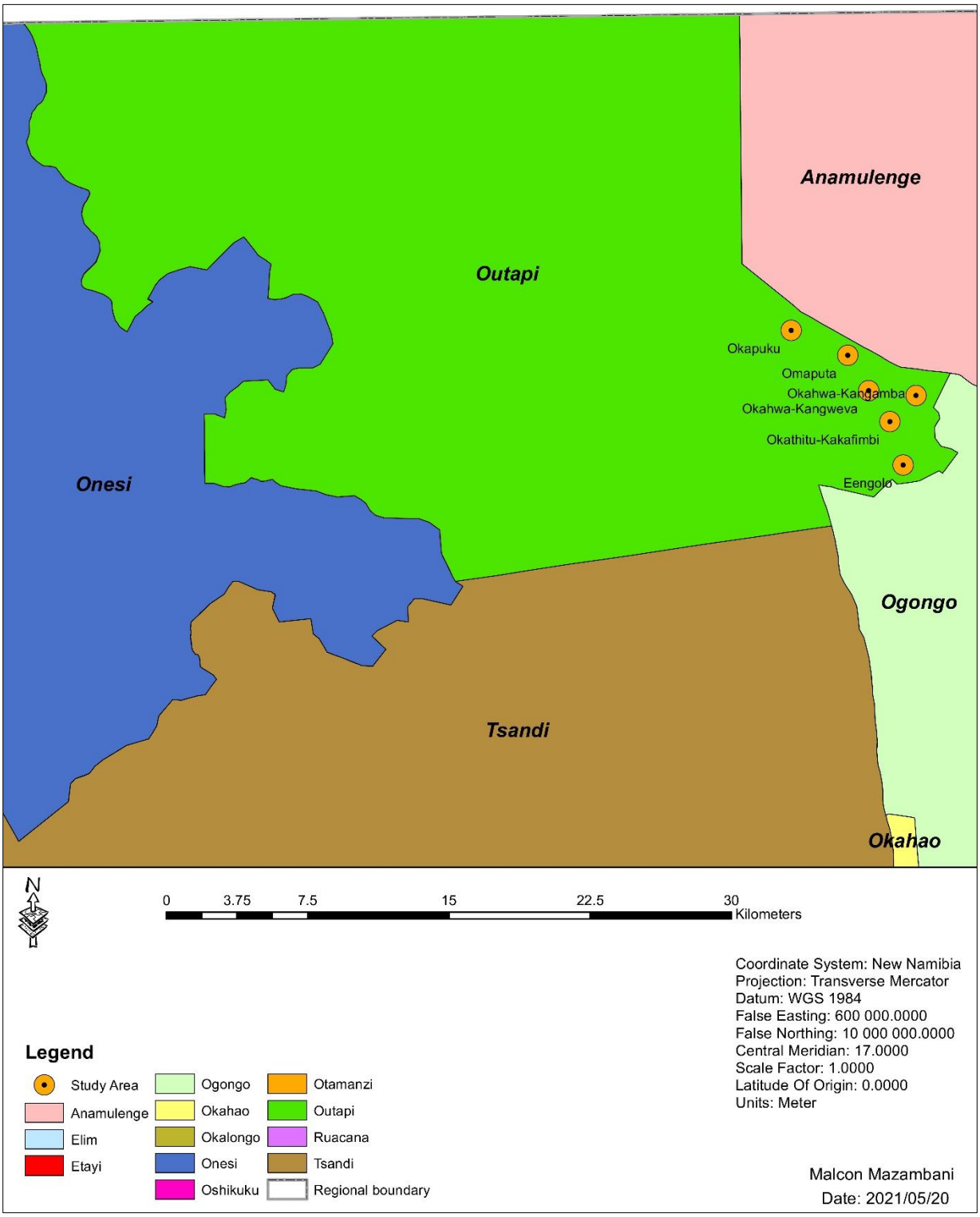

Figure 10: The study area: Outapi Constituency

Source: (Mazambani, 2021)

The provision of tap water to villages in Eengolo settlement, which is the primary study area, is by means of the rural water supply administered by the Ministry of Urban and Rural Development in partnership with the Ministry of Agriculture, Water and Land Reform, through Namibia Water Corporation. It is unfortunate that it was established at the time of fieldwork that not all communal households in all five villages visited have access to portable clean tap water because of fee-based services, but the relevant authorities, in collaboration with rural water supply, are coordinating all efforts and determination to ensure that all communal households have fully functional water infrastructures with access to clean running tap water (Wilhelm, 2012). The study established that a secondary key water source is the public water canal that offtakes from the Kunene River over the Etaka water catchment area until Ondangwa.

This water supply canal was built in north-central Namibia many years ago, and it is still functional in providing more than 600,000 inhabitants residing along it and nearby villages with water all year round (Weidlich, 2019). Moreover, Weidlich (2019) added that the open canal is fabricated with concrete lumps and starts from Calueque dam on the southern part of the Angolan borders towards the Kunene River, which lies next to the Ruacana hydropower station that is a few kilometres away from the borders. Weidlich (2019) further describes the canal on the Namibian side, saying that it is constructed parallel to the B1 tarred road. It is worth noting that residents residing on villagers next to the canal make use of the water for human consumption, household uses, drinking for livestock, irrigation of backyard gardens, and other horticultural schemes. Weidlich (2019) further explained that attempts and recent negotiations by the Namibia Water Corporation to cover the canal with concrete slabs were not fruitful as they were met with strong resistance from the local inhabitants surviving on the canal. In a nutshell, this water canal plays a major role in the community's livelihood, as it constantly supplies water throughout the year (Kapuka, 2014).

3.2.2 Demography

Outapi Constituency has a population of 36,740 inhabitants, of which 16,593 (45.2%) are male and 20,147 (54.8%) are female, and has a population density of 38.71 people per square kilometre (NSA, 2011). It is unfortunate that this study has to rely on statistics from the 2011 Population and Housing Census, since they are the formal statistics available at the moment, even though they are not updated as it has been 12 years since the 2011 census. To address this, the Namibia Statistics Agency plans to conduct the 2023 Population and Housing Census from September 18–November 3, 2023. Furthermore, official national

statistics from the NSA show that the dominant age group composition is 15-59 years, and on marital status, 65 percent of the inhabitants are not married, while only 17 percent are married with certificates. NSA (2011) further reported that the average number of individuals per household stands at five, with the majority being female-headed households, which stands at 54 percent. As per the Omusati Regional Council [ORC] (2015), the settlement of Eengolo consists of a few prominent features that are particularly noticeable, such as a government health clinic, Eengolo Combined School (from grade zero to grade ten), and Eengolo Evangelical Lutheran Parish. Another prominent feature is a well-established sports field that was developed in the area, hosting a number of annual sporting events (ORC, 2015). All these prominent features are electrified, plus a few communal households. In terms of network coverage, the common and local Mobile Telecommunications Company (MTC) network reception has been poor in recent years. To address this, the mobile communication giant MTC erected a network tower at the settlement in the year 2020, and this initiative was positively received and applauded by local residents (ORC, 2015).

Shivute (2013) states that, as part of the five-year Strategic Plan 2013-2017 of the Ministry of Works and Transport, a gravel road linking the settlement and Outapi town was recently constructed by the Ministry of Works and Transport-Roads Authority. This makes it easier to transport goods and services. This specific gravel road is in a good state as it is regularly and continuously maintained. Also, this ensures that transportation services are accessible to the majority of marginalised and less privileged communities to benefit from development. As part of the long-term plan, the Ministry of Works and Transport, through the Roads Authority, is at the moment revising road master plans at the regional level to prioritise road construction and tarring several gravel roads. This will help in enhancing socio-economic development and interlinking road networks (Shivute, 2013).

Marketing of goods is popular in the area, with a number of increasing cuca shops selling alcoholic and non-alcoholic beverages, plus several mini-market shops that sell household items for daily use (ORC, 2012). ORC (2012) further reports that the general arrangement of communal homesteads is that they are spread out, with the majority of them situated alongside Oshana's, which are formed by the Cuvelai water system channel that originates in southern Angola. In terms of access to tertiary institutes of higher learning, Namibia’s higher learning institution, the Namibia University of Science and Technology, has one of its regional centres in the constituency, which is part of the decentralisation process implemented by the institution (ORC, 2015).

3.2.3 Agricultural production

The type of land tenure present is communal land. Communal land belongs to the state as per the Namibian Constitution and the Communal Land Reform Act, 2002 (No. 5 of 2002) (Ministry of Lands and Resettlement [MLR], 2009). The type of agricultural farming is communal farming, which is practiced on customary land that is fenced off individually. In these fences, there are crop fields around traditional, semi-traditional, or modern homesteads where cultivation of crops such as mahangu, sorghum, maize, beans, groundnuts, watermelons, and other horticultural crops is performed (Namibia Statistics Agency, 2015). Grazing land in communal areas has no limitations outside the said fences, and grazing is practiced in areas referred to as commonage grazing land.

Communal farmers in the area are continuously capacitated by agricultural extension officers from the Directorate of Agricultural Production, Extension and Engineering Services (DAPEES) of the MAWLR. These officers are stationed in the Ministry of Agriculture's office in the region and Rural Development Centres in the constituency to act as links between researchers, the government, and communal farmers. Owos-Oab (2014) specified that according to Namibia's National Agricultural Policy, agricultural extension services are basically aimed at assisting farmers either in communal or commercial farming areas to develop and embrace enhanced farming technologies and sustainable agriculture practices. This assistance will greatly assist in organising farmers into self-help-oriented groups and networks at the regional, national, and global levels of agricultural markets, services, infrastructure, and policies. Agricultural extension officers typically assist communal farmers with decision-making while at the same time ensuring that appropriate awareness is delivered and implemented in order to achieve the best desired results (Shigwedha, 2019). It is worth noting that if communal farmers are well-equipped with sustainable farming skills, sustainable agriculture can be achieved. This way, it warrants a sustainable and self-sustaining future in a revolving manner.

3.3 Research design

A good research design is often defined by adjectives such as adaptable, suitable, functional, and cost-effective, among others (Akhtar, 2016). To explore the 2018/19 agricultural drought readiness and recovery measures of communal farmers and aligned institutions in the Eengolo settlement of Outapi Constituency, a case study approach was employed. A case study approach assessed the readiness of

communal farmers, responses and interventions, and post-recovery measures for the drought. This was a stepping stone in understanding, assisting, improving livelihoods, and increasing the future potential and stability of rural populations in the event of a drought or any related disaster. Mutekwa (2016) supported the notion of time, which states that, because of the short time for the analysis, a case study was regarded as appropriate for this study. This study only concentrated on a single settlement and collected all the necessary information in a comprehensive manner, rather than engaging a larger area at the regional or constituency level with less information. This was adopted because of time and other limitations. A case study method was a useful approach to addressing the how and why questions of this study (Akhtar, 2016).

The study employed a mixed-methods approach to gather all the necessary data and information. Ivankova and Clark (2016) define and interpret the mixed research method as a procedure that involves collecting, analysing, and combining both quantitative and qualitative data within a single study. Furthermore, a mixed research method provided both numeric and text data concurrently and allowed for contextual interpretations and flexibility in choosing the best approaches to answer the research questions of the study. In order to fully fulfil all research objectives, a mixed research method was chosen as a feasible option for this specific study. Therefore, both qualitative and quantitative methods were taken into consideration.

To understand the association within study variables such as socio-economic household characteristics, drought readiness, drought response strategies or interventions, and communal farmers' recovery measures to drought, a quantitative research method was applied. This helped in collecting numerical data that is subjected to statistical analysis (Creswell, 2012). The questionnaire that was administered to communal households was fully coded, and all data collected addressed the objectives of this study were subjected to statistical analysis. To fully understand the in-depth experiences of communal households and institutional and key informant interviews in relation to the drought, a qualitative research method was used to garner respondents' insights and views by collecting data consisting of texts. Both research approaches supplemented each other and allowed for a complete analysis of the results of the study and, in turn, a complete understanding of the research problem. Zohrabi (2013) believes that making use of numerous types of data collection procedures and attaining specific data and information by means of various sources can supplement and strengthen data validity, reliability, and complete interpretation.

Patterns derived from quantitative data attained from respondents to household interviews were explained and complemented by data collected by means of key informant interviews.

3.4 Sampling

3.4.1 Sampling design

Sampling is important since studying an entire population is both costly and time-intensive. It is, however, important that if the sample is representative, the study findings would be similar to those collected by interviewing the population at a much lower cost (Bhardwaj, 2019). A mixed sampling design consisting of purposive (non-probability) and cluster sampling (probability) was employed. Wegner (2012) defines cluster sampling as where the target population is naturally divided into clusters, where each cluster is similar in terms of profile to every other cluster. Leedy and Ormrod (2015) explain purposive sampling as a way of purposefully selecting specific units for a particular purpose. During the undertaking of this study, Outapi Constituency was the target area, and out of a number of settlements, Eengolo Settlement was purposefully selected. This selection was grounded in a literature review, as this area was heavily impacted by the 2018/19 agricultural drought under review. Households referred to as primary sampling units within all clusters (villages) of the settlement were sampled by means of cluster random sampling.

Prior to selecting a representative sample size, the researcher requested and obtained approval for the technical assistance of data sets from communal households in the targeted villages. After approval was granted by the Executive Director of the Ministry of Agriculture, Water and Land Reform, data sets containing sheets with lists of all communal households of the targeted and selected five villages in Outapi Constituency, namely: (i) Okahwa-Kangamba, (ii) Okathitu-Kakafimbi, (iii) Okahwa-Kangweva, (iv) Okapuku, and (v) Omaputa, all accommodated on the Namibian Communal Land Administration System, were made available to the researcher for sampling purposes.

3.4.2 Sample size

A representative sample for this study was determined in accordance with Leedy and Ormrod (2015) standards and guidelines. Initially, during the planning phase, the study population was +/-400 households. This is according to the data retrieved from data sets from the Namibia Communal Land

Administration System (NCLAS), which administers registered and issued new and existing communal land rights in Namibia (Middleton, Carlowitz & Becker, 2016). Geographical Information System data sets that were retrieved from NCLAS show that the study area consists of +/-400 households, and the area covered is approximately 129,277,323.18 m2/129 km^2 (Mazambani, 2021). A set of guidelines and standards offered by Leedy and Ormrod (2015) and reinforced by Gay, Mills and Airasian (2012) specified prior to the undertaking of the study that if the population size is about +/-500 (give or take 100), 50% of the attributes of the population should be sampled to give a true reflection of the entire population. Based on the guidelines provided, it was imperative that a sufficient and representative sample size of +/-200 households be sampled and interviewed through face-to-face interviews with respondents.

3.4.3 Number of Communal Households sampled and interviewed

Table 4: Fieldwork data collection sheet on sampling

Name of the Village	Total Number of Households	Number of Households sampled	Number of Households Interviewed	Deficit
Omaputa	15	7	7	0
Okapuku	28	14	14	0
Omakuku	54	27	27	0
Okafitu-kakafimbi	65	32	26	6
Okahwa-kangamba	65	32	30	2
TOTAL	**227**	**112**	**104**	**8**

3.5 Data collection

First and foremost, the researcher received clearance and approval from the NUST Higher Degrees Committee pertaining to data collection instruments. The researcher further received an authorisation letter that served as confirmation and study identity. Before embarking on interviews with the sampled communal households and selected key informants, the researcher paid a courtesy visit to Omusati Regional Council and Ombalantu Traditional Authority. The aim was to provide a brief overview of the

study, which included the purpose, target population, timeline, and benefits of this particular study. During this study visit, the researcher emphasised the need to effectively convey awareness information to the Chief Regional Officer of Omusati Regional Council, the Councillor of Outapi Constituency in particular, officials at Ombalantu Traditional Authority, and the heads of several villages that were selected. To supplement the identity of the researcher in the community, two separate research authorisation letters were issued by (i) Ombalantu Traditional Authority and (ii) Omusati Regional Council. These letters warrant permission from the researcher as a means of enabling fieldwork by engaging sampled communal households. As a prerequisite, the researcher was instructed to use the collected information for the purpose of this study and furnish findings to Omusati Regional Council by means of the final study report upon completion of the study.

A household study questionnaire consisting of both open-ended and closed-ended questions was administered to communal household respondents by means of face-to-face interviews. This questionnaire collected measurable quantitative and qualitative data. The intention was to administer the household questionnaire to the head of every household. In instances where the household head was absent, the research assistant interviewed an adult who is well-versed in household operations and knowledgeable about the drought under review. In some instances, a replacement household was selected to substitute. A household was used as a measurement unit for this particular study. NSA (2011) defines a household as "a group of people—related or unrelated—who live in the same dwelling unit and share or have common catering arrangements" (p. 63). Key data on the subsequent components, as indicated in Table 3, were collected by this study. Prior to data collection, all two sets of questionnaires were submitted to a professional language translator with the aim of translating them into the vernacular language of Oshiwambo, which is the common and indigenous language among the target population. This was performed in order to enable the researcher to convey accurate information and obtain accurate responses from respondents to minimise errors and misunderstandings due to language barriers. Ultimately, this helped all research assistants immensely in asking questions.

Table 5: Study components and key data that was collected

Study components	Key data to be collected
Demographic features of household	Respondent gender, relationship of respondent to household head, household size, household head age, marital status and education level
Source of household income	Employment status, and source of employment of the head of the household
Household asset ownership	Dwelling unit, agricultural and non-agricultural equipment's
Agricultural production	Agricultural land, types of crops grown, average yearly crop production, type of livestock owned, number of livestock owned, and crop and livestock marketing strategies
Impact of the 2018/19 agricultural drought	Drought era, water situation prior to and during drought, grazing conditions prior to and during drought, extent of crop production prior to and during drought, livestock mortalities during drought, and environmental impact by drought
Drought readiness strategies	**Strategies to mitigate drought effects on livestock** (Livestock destocking, livestock relocation, livestock supplementary feeds, drought resilient/indigenous breeds, and early warning/advice to communal farmers) **Strategies to mitigate drought effects on crops** (Drought-resistant crops, irrigation of crop fields, establishment of backyard gardens, dry/early planting/ploughing, mixed cropping, mulching, weeding, seed density reduction, and early warning/advice to communal farmers)
Drought interventions	**Household livelihood coping strategies** (Dietary reduction, food seeking, and drought relief food parcels, food reserves and selling household items) **Soil and water management strategies** (Irrigation, backyard garden establishment, crop/vegetable windbreak, water conservation, soil erosion prevention, controlled litter disposal, and good tillage practices) **Livestock herd management strategies** (Destocking, early weaning, herd separation, parasite control, feeds licks and supplement fodder, and establishment of new water points)
Post-drought recovery strategies	Build livestock herd, debt repayment extension to financial institutions, compensation by insurance companies, compensation by GRN, agricultural diversification, other emergency funds, provision of

	sufficient water supplies, access to drought tolerance and improved seeds from GRN, access to training on conservation agriculture, better crop management practices, and capacity building of communal farmers
Key structural and institutional support systems	Community and institutional interventions during drought, national readiness, response structures and support systems, institutional interventions and recovery actions

Gutiérrez, Engle, Nys, Molejón and Martins (2014) highlighted that drought readiness is an approach that is geared towards building resilience and adaptive capacity at the rural household level. They further specified that drought monitoring and prediction, susceptibility, impact valuations, mitigation measures, response planning, and support systems are all part of the drought readiness strategy. They further specified that all these drought readiness strategies are parallel to the World Bank's disaster risk management. The World Bank framework primarily focuses on proactive actions that have the ability to be implemented with the key aim of lessening human, ecological, and economic impacts. Introducing proactive drought readiness management approaches is important as it builds resilience in water resources and communities, minimises economic losses, and overall, improves disaster interventions and post-drought recovery. Communal households were accorded the opportunity to select appropriate and effective drought readiness strategies for livestock production that they employed prior to the drought.

Another approach that was employed by this study was a separate, unstructured questionnaire that was self-administered to nominated key informants. Key informants were various institutions at national, regional, constituency, settlement, and village levels. These institutions were consulted because they directly play a major role in the drought national readiness, response, and support system. Office requests by means of mobile phones and email were employed to secure appointments with several knowledgeable officials of the subsequent institutions: Institutions consulted were the Office of the Prime Minister (National Disaster Risk Management Committee) (Directorate of Disaster Risk Management; Outapi Regional Council which consists of the Regional Disaster Risk Management Committee, Local Authority Disaster Risk Management Committee, Constituency Disaster Risk Management Committee, and Settlement Disaster Risk Management Committee); line Ministries – Ministry of Agriculture, Water and Land Reform specifically the Directorate of Planning and Business Development (Food Security) and Directorate of Agricultural Production Extension and Engineering Services; Ministry of Health and Social

Services – Nutrition Section; Ministry of Works and Transport - Namibia Meteorological Service (Early Warning Information System).

Respondents from all interviewed institutions were furnished with an electronic copy of the questionnaire, which they self-administered. Furthermore, they are knowledgeable about their roles and responsibilities in the community and about key structural and institutional support systems in the community; hence, they were interviewed as key informants. The researcher probed for data on their roles and responsibilities within the designated study area. The researcher further inquired about the impact of the 2018/19 agricultural drought, drought as a challenge in the area, drought readiness, drought interventions, and recovery measures they observed being employed. However, aspects of key structural and institutional support systems were unpacked. All completed questionnaires were checked thoroughly and verified for consistency by the researcher or team supervisor as soon as they were received at the end of each day's work.

3.6 Data analysis

3.6.1 Data cleaning and analysis

Prior to data collection by means of fieldwork, all closed-ended questions of the household questionnaire were coded into numerical figures, as this enabled easy entry of response codes into SPSS (Statistical Package for Social Science) version 26.0, which in turn made analysis of several variables easy (George & Malley, 2019). However, a few final open-ended questions of the household questionnaire and the entire key informant questionnaire were not coded. These were meant to accord household respondents and knowledgeable key informants with an opportunity to express themselves and give insights on aspects that were not covered by close-ended questions.

After data collection was completed, data cleaning was performed to validate, detect, and remove (or perform correction) errors and discrepancies in a data set that occurred due to the wrong entry of the data. In that regard, incomplete, imprecise, and inappropriate data was identified, and the relevant measure was applied, which was either to replace, correct, or delete. Incorrect or inconsistent data can lead to a variety of issues, including the drawing of inappropriate conclusions (Chu, Llyas, Krishnan &

Wang, 2016). Data coding to assign numerical numbers, data entry, and analysis were all undertaken by means of SPSS. This was supplemented by Microsoft Excel. In most instances, all descriptive statistics were analysed with SPSS, but some graphs and tables were performed by Microsoft Excel. However, data sets that were geared towards determining the relationship between variables by means of cross-tabulation were performed by means of SPSS, as it offers a wide range of complex analytical tools.

Data from key informant interviews was collected, and this comprised of qualitative, in-depth interviews with knowledgeable individuals from institutions that are well acquainted with the local community operations of the study area. Cossham and Johanson (2019) define key informants as individuals who are knowledgeable and contribute their perspectives on a particular research problem or underlying situation that a researcher is unable to know. In most cases, key informants are not usually research participants, but they contribute by elevating and broadening a researcher's understanding with precise insights that will assist in reducing potential bias. Since the key informant questionnaire had only open-ended questions, responses (qualitative data) from interviews were noted. All responses provided by respondents by means of interviews were summarised into broad themes and sub-themes, compared, and conceptualised into thematic groupings. The analysed qualitative data were interrelated and interpreted with the results from the quantitative data analysis.

3.6.2 Analytical approach

Table 6 shows an outline of the data analysis process and how it was applied in this study.

Table 6: Data analysis by specific objective

Objective	Data used	Analysis method performed
To assess the level of readiness by communal farmers prior to the 2018/19 agricultural drought	**1) Independent variables:** • Age • Gender • Educational level • Marital status • Employment status **2) Dependent variables:** **2.1 Drought readiness on livestock:** • Livestock destocking • Livestock relocation • Livestock supplementary feeds	Descriptive statistics Cross-tabulation Thematic analysis

	• Drought-resilient breeds • Early warning or advice **2.2 Drought readiness on crops:** • Drought-resistant crops • Irrigation of crop fields • Establishment of backyard gardens • Dry/early planting • Mixed cropping • Mulching • Weeding • Seed density reduction • Early warning or advice	
To analyse drought interventions employed by communal farmers and other stakeholders (government, development partners, and private sector)	**1) Independent variables:** • Age • Gender • Educational level • Marital status • Employment status **2) Dependent variables:** **2.1 Household livelihood coping strategies:** • Dietary reduction • Food seeking • Drought relief food parcels • Food reserves • Selling household items **2.2 Soil and water management strategies:** • Irrigation • Backyard garden establishment • Crop/vegetable windbreak • Water conservation • Soil erosion prevention • Controlled litter disposal • Good tillage practices **2.3 Livestock herd management strategies:** • Destocking • Early weaning • Herd separation • Parasite control • Feeds licks • Supplement fodder • Establishment of new water points	Descriptive statistics Cross-tabulation Thematic analysis

To analyse post-drought recovery strategies employed by communal farmers and other stakeholders (government, development partners, and the private sector)	**1) Independent variables:** • Age • Gender • Educational level • Marital status • Employment status **2) Dependent variables:** **2.1 Post-drought recovery strategies:** • Build a livestock herd • Debt repayment extension • Compensation by insurance companies • Compensation by GRN • Agricultural diversification • Other emergency funds • Provision of sufficient water supplies • Access to training on conservation agriculture • Better crop management practices • Capacity building of communal farmers	Descriptive statistics Cross-tabulation Thematic analysis

3.7 Ethical considerations

The security of human subjects through the implementation of relevant ethical standards is critical in all scientific studies (Arifin, 2018). Hence, this study observed the highest possible ethical and professional codes of conduct. In all types of research, participation should be completely voluntary, with no bullying, force, intimidation, or dishonesty (Marshall et al., 2014). Informed consent is a mechanism that is applied in research that requires human interventions to ensure that potential participants fully understand what they are being asked. They are informed if there are any potential negative consequences of such participation (Arifin, 2018).

First and foremost, the right of admission to commence with the data collection phase of the Eengolo Settlement was established by means of a letter. This letter created awareness and sought approval to be accorded the opportunity to interview respondents from communal households through face-to-face interviews. This request was addressed to Omusati Regional Council, Outapi Constituency Council, Ombalantu Traditional Authority, and village headmen. The objectives and benefits associated with the study were clearly highlighted and stipulated. As all communal farmers in the Eengolo settlement area

are well conversant with Oshiwambo and the English language, the interviewing and interaction were done in any of these languages, where appropriate. The researcher succeeded in getting all questionnaires translated into the vernacular language to enable understanding. After paying a courtesy visit to various authorities for an introduction and briefing on the purpose of the study, a number of ethical issues were taken into consideration during the undertaking of this study after approval was granted.

This study ensured that a high level of confidentiality was observed at all times in protecting and safeguarding participants' views. All participants were informed of confidentiality pertaining to the information they provided to enumerators through face-to-face interviews. They were nevertheless informed that their identity would not be revealed in any way in the resulting report. All participants remained anonymous as such, and their personal details, including names, did not reflect a arising results of this study. The data collected from them was treated with a high level of confidentiality and was only used for the purpose of this study.

The researcher ensured that all participants had full rights to demand explanations of study findings after completion of the study. A number of participants expressed their concerns regarding debriefing feedback from the researcher pertaining to the results of the study findings, which are fundamental to the betterment of livelihoods in the community. Aggrieved and concerned participants were informed that results from this study will only be available and ready to be communicated to them after the approval of the final thesis by the institution.

A number of issues related to academic decency received maximum attention during the undertaking of this study, and this includes plagiarism, academic fraud, and misrepresentation of study results. All materials consulted by this study were appropriately cited and referenced in the literature and other applicable parts of the study. All communal household questionnaires were verified and cross-checked by the field supervisor every day for correctness and uniformity. The researcher ensured that the collection, analysis, and interpretation of data were conducted in the correct manner with appropriate statistical analysis and that misinterpretation of information was avoided.

3.8 Chapter summary

This chapter provided an extensive and detailed description of the study area by highlighting the geographical location, demography, and agricultural production. This chapter discussed the scope, research design, and data collection methods. As part of the research design, a case study approach was used as a means of assessing the readiness of communal farmers, interventions, and post-recovery measures for the drought. This was fundamental in assisting and improving livelihoods and strengthening the potential and ability of rural populations to be resilient in the event of a drought or any related disaster. The population for the study was identified, and an appropriate sampling technique that was deemed fit was employed to ensure that a representative sample size was drawn. All benefits associated with the study were highlighted in this chapter and were further communicated to all interviewed communal farmers and key stakeholders consulted.

Chapter 4: Results and discussion

4.1 Introduction

This chapter provides more inclusive study findings and analysis as per the data collected by means of communal household interviews and key informant interviews. All study findings are therefore presented in both tabular and graphical format, with descriptions of study outcomes. The chapter is separated into nine (9) sections, beginning with the first section that presents a description of the household composition and related characteristics. Household income is presented in the second section, while household asset ownership is presented in the third section, respectively. The agricultural production of communal farmers is presented in the fourth section, while aspects pertaining to the impact of the 2018/19 agricultural drought on the livelihoods of communal farmers are presented in Section 5. Discussions on the level of readiness of communal farmers in terms of strategies are discussed in the sixth section, while responses employed by communal farmers to the drought under review are presented in section seven. The eighth section presents post-drought recovery strategies employed by communal farmers after the drought. The last section deliberates on a brief thematic analysis. This analysis forms part of the readiness, response, and recovery to shocks and hazards of the 2018/19 agricultural drought in the study area.

This chapter discusses the results of the study that emanated from the data collected and draws sound deductions about the study findings. The discussion of the findings in relation to the problem statement and research questions defined in Chapter 1 is an important and integral aspect of authoring the discussion of results. The noteworthy findings and the researcher's interpretation of the results are included in the discussion section. It is worth noting that deliberation on the study findings will be performed in this chapter to determine how study findings are linked to studies published or not published in the literature review, as well as other associated writings. The study findings were aligned, and relations were linked to the literature review. Supplementary analysis such as cross-tabulation and thematic analysis will be presented in this chapter. This will help in explaining the relationship that exists amongst the variables under investigation and understanding the detailed patterns that exist in the data.

4.2 Household demographics

Household demographics basically present an overview and the general characteristics of interviewed households, and this overview illustrates how several characteristics of the population are represented. Household demographic information presented in these sections is age, gender, marital status, level of education, and employment status of respondents.

4.2.1 Age

The age of the household head is an important aspect in the selection of appropriate readiness and recovery strategies employed by communal farmers. Gidey et al. (2023) explained that the age of the household head is mostly associated with agricultural farming experience, as this is linked to the assumption that the knowledge of the household on drought readiness and recovery measures often progresses as the household head grows older and therefore becomes more knowledgeable. The relative age group of household heads that emerged to be associated with the highest number of responses is above 60 years, which emerged with a 64%. This figure represents more than half of the households interviewed in this study, with 14%. Furthermore, the age group of household heads in the range of 51–60 years (21%) emerged as the second highest in terms of age representation, while the least age group (<=30 years) of household heads stands at 3% (Figure 11).

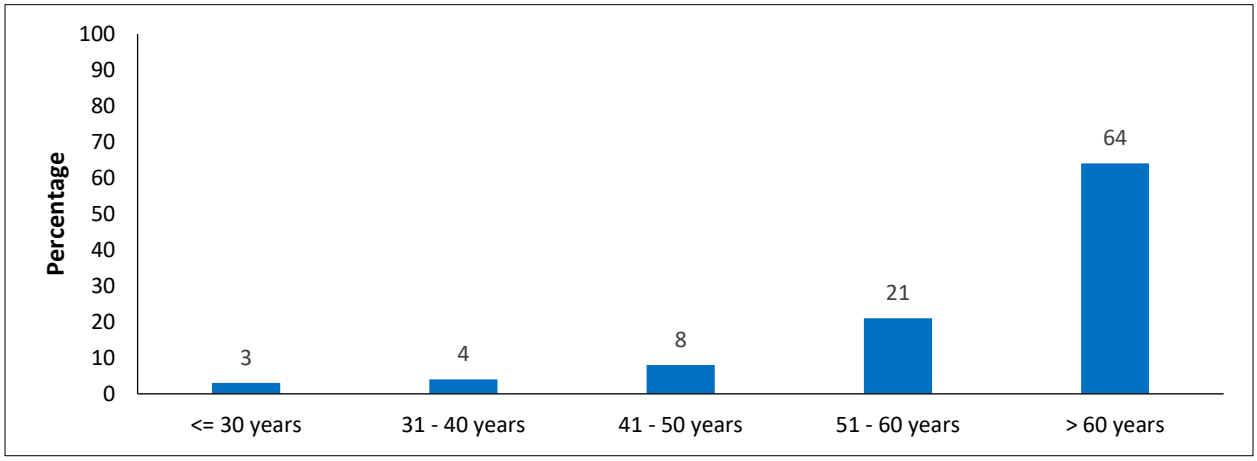

Figure 11: Distribution of household heads by age group

The key reason that contributes to the highest representation of the above-60-year-old category of household heads (64%) is that professionals retire or are retrenched either way from their full-time jobs.

The majority relocate to communal areas, normally known as villages, where they will be residing permanently, since that is where they originated from with their physical dwelling structures established in communal areas. Another possible factor that contributes to high representation in terms of the above-60-year category, is that the majority of household heads in communal areas are pensioners, who are either full-time communal farmers. They are highly dependent on pensions and other GRN support programmes. Furthermore, communal homeownership increases with an increase in age.

Findings in Figure 11 show that only a few household heads fall into the category of 40 years and below (7%). This is attributed to factors such as the younger generation's ability to add to the workforce. The majority prefer to opt for rural-urban migration, which is the biggest among this age group. This specific age group is regarded as extremely mobile, with constant movements from one place to another in search of better employment opportunities or education enrollments. Another associated contributing factor is the perception of the youth that employment opportunities are high and readily available in urban areas. They prefer to migrate to urban areas in search of employment opportunities to earn a better living while sustaining households back in communal areas with monthly remittances. Some youth leave communal areas because they are reluctant to work in crop fields.

4.2.2 Gender

Gender is one of the essential variables in the illustration of demographic information in this study. Myeni and Wentink (2021) indicated that gender plays a significant role and determining factor in the manner in which men and women prepare, respond, and recover from drought. This is also linked to the vulnerability of social life, power aspects, and the roles of men and women. Myeni and Wentink (2021) further explained the importance of linking the gap that exists between gender and disaster risk management among smallholder farmers. The main reason is to basically strengthen coping capacity between both genders. Generally, women and children are mostly vulnerable and exposed to the impacts that come with drought, as opposed to men. Women need constant support to ensure that they employ effective drought readiness and recovery measures that will protect their livelihoods from the risks associated with drought. Results in Figure 12 indicate that there is a fair representation and distribution of gender in terms of household head, whereby both males and females emerged with 50%, respectively.

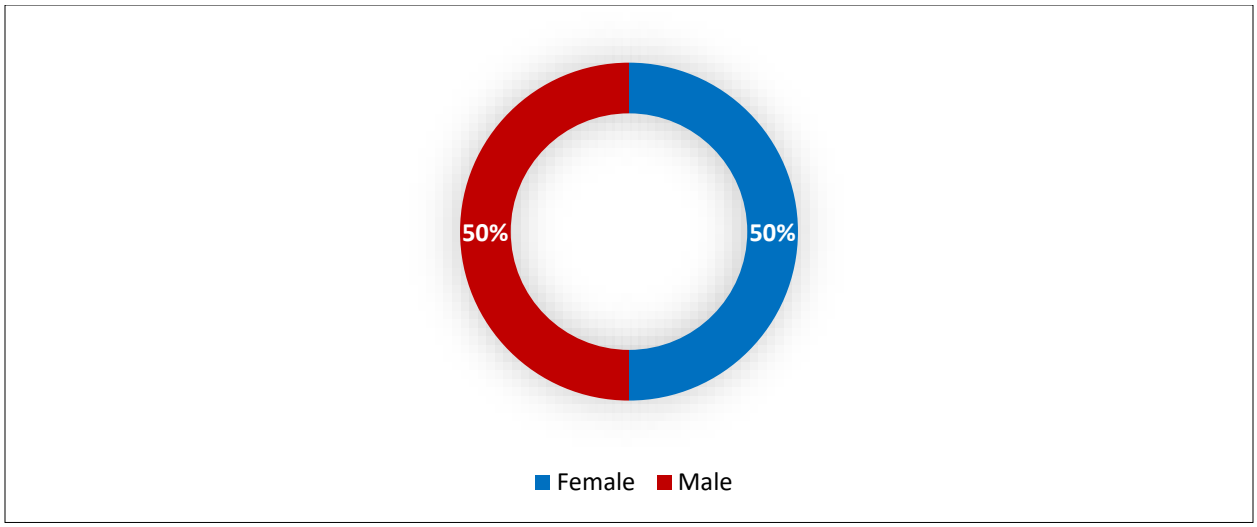

Figure 12: Distribution of household heads by gender

This study's findings on gender distribution conform to demographic statistics from Namibia's 2011 Population and Housing Census report. The gender distribution specifically for the Omusati region as presented in the census report shows that male-headed households stood at 45%, while female-headed households stood at 55%, with a margin of 10% (NSA, 2011). The rising population since then, in 2011, has led to the registration of new and existing communal land rights. Other contributing factors are: (1) transfers (passing a land right to another person, and by doing so, some sort of compensation is likely to be payable); (2) religuish (giving up the land right when the interest to hold such land right is no longer there); and (3) succession (re-allocating a land right to a member of the family, and it is received without paying any sort of compensation) of customary land rights as per the provision of the Communal Land Reform Act, Act No. 5 of 2002. These scenarios have a potential impact on the transformation of communal land ownership dynamics.

Another reason that might have been a contributing factor in the gender balance between male and female-headed households is the amendment of the Communal Land Reform Act, No. 5 of 2002. In the past, women and children were previously disadvantaged by the previous administration of communal land administration. Before the enactment of the Communal Land Reform Act, allocations of communal land were not profiled; as such, land was transferred orally, which may result in land-related disputes, e.g., double allocations of a single parcel of land, boundary disputes, unauthorised extensions, and illegal fencing (MLR, 2009). As the land allocations were neither regulated nor monitored, there were emerging reports of unequal distributions of land in communal areas. Women and children were especially

vulnerable with regard to land allocation, as most of them were left homeless on land they were occupying with their spouses, as such land is forcefully taken by relatives of the spouse (MLR, 2009). All these sorts of actions left women and children victims of landlessness and poverty. It is for that reason that the CLRA was amended accordingly to ensure that women and children are catered for in the event of a spouse's death.

4.2.3 Marital status

Marital status is an integral constituent of this study, as it actually arranges the entire life of an adult and influences the psychological, decision-making, and physical well-being of males and females. The marital status of smallholder farmers plays a critical role in the manner in which these farmers employ appropriate drought readiness and recovery measures (Muthelo, Sekyere & Ogundeji, 2019). A household head who is married is expected to possess a wealth of knowledge and skills on employing appropriate drought coping strategies since there is sharing and support of new knowledge from the spouse as opposed to single or widowed household heads (Muthelo, Sekyere & Ogundeji, 2019). Another major supporting factor is the distribution of wealth in the household, as married household heads are most likely to get support from their employed spouses, which is vital in drought readiness and recovery efforts. Single and widowed households with a single stream of income are most likely to experience financial burden (Gidey et al., 2023). Figure 13 shows that the majority of household heads are married with a legal certificate (42%), followed by single (29%) and windowed (19%) household heads.

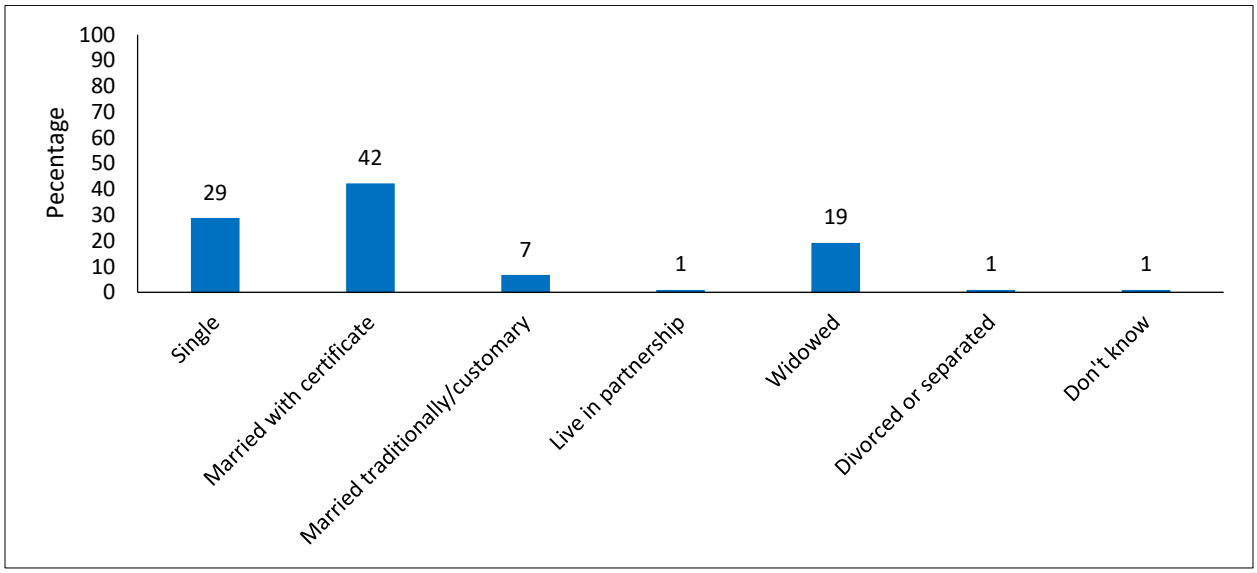

Figure 13: Distribution of household heads by marital status

It is concerning for widows and single heads of households (even though widows can be either male or female), as they are mostly regarded as vulnerable groups in communities. They constantly require any form of assistance from either fellow community members or the government to have the ability and support to cope with events such as drought and other catastrophes. They are on the verge of being fragile and susceptible to external, evolving shocks of all kinds.

As displayed in Figure 14, it is particularly clear that results from the cross-tabulation analysis of gender distribution by marital status show that the majority (38%) of males are married with certificates, presiding over 4% of females in the same marital category. On a separate note, 23% of females are single, presiding over 6% of males in the same category.

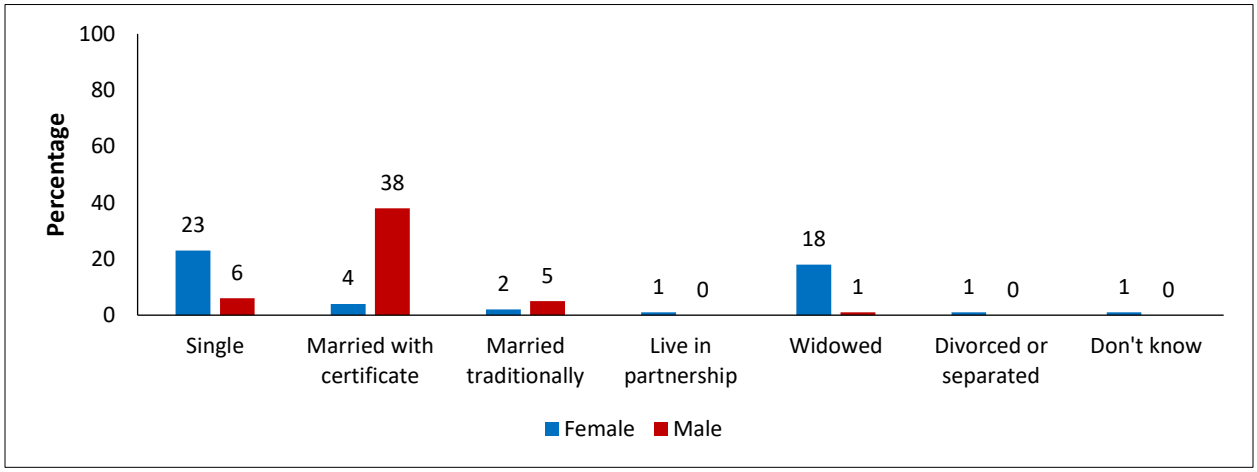

Figure 14: Distribution of household heads by gender and marital status

Analysis further shows that 18% of households are headed by widows. This finding generally indicates that households in communal areas are socially satisfactory, as the majority of the respondents are married with a certificate. It is believed that they will render assistance to one another, especially in decision-making matters. They will also develop sustainable strategies on how to prepare for, respond to, and recover from natural disasters such as drought. Concerns associated with females making up a large portion of single and widowed-headed households are that there is a general view that women are mostly socially vulnerable as compared to men. Their vulnerability is coupled by greater poverty rates and minimal employment prospects, and these opinions are mostly common for households headed by females (Lebni et al., 2020). Concerns linked to the results in Figure 14 are that these females are required

to perform a wide range of roles, as they are forced to perform seasonal, casual, and low-income-generating work as they lack opportunities for better-paying jobs. As a result, these women will be unable to maintain their livelihoods with rising poverty, deprived socioeconomic status, and several responsibilities.

4.2.4 Level of education

The education of the household heads interviewed is essential to the undertaking of this study. Gidey et al. (2023) emphasised that literacy is instrumental in understanding drought readiness and recovery strategies. It helps smallholder farmers strengthen their resilience in terms of coping with and mitigating several natural disasters. Exposure to education contributes to efficiency, capability, income generation, employing technologies, and becoming ambitious. This helps in creating an enabling environment to adequately educate smallholder farmers with long-term plans that will ensure sustained living conditions as opposed to illiterate farmers (Gidey et al., 2023). Literature shows that the level of literacy could greatly influence the adoption of communal farmers' drought readiness and recovery strategies, which are mainly linked to the behaviours of respondents.

Data on the highest level of education of interviewed household heads were collected with the aim of establishing the multidimensional status and educational access in all forms among communal farmers. Figure 15 clearly shows that the majority, 27% and 26% of household heads, received primary and secondary education (the old grading system employed in the country prior to the independence of Namibia) as their highest level of education, respectively.

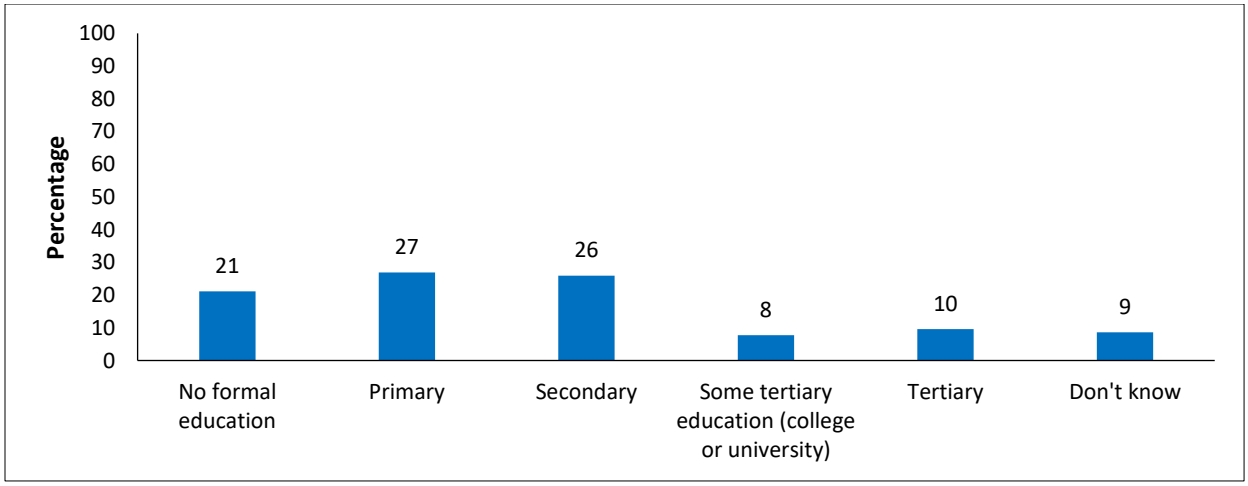

Figure 15: Distribution of household heads by highest level of education

It is encouraging that the majority of household heads in the community are educated, as they are expected to interpret agricultural advice relating to communal farming and understand early warning information on drought that is communicated to them. Furthermore, the fraction of educated household heads is expected to be well-equipped and conversant with knowledge on drought readiness strategies, drought intervention strategies, and drought recovery strategies.

It is extremely worrying that 21% of household heads have not received any formal education as they are uneducated, and this is attributed to political turmoil in accessing education prior to the independence of Namibia (Figure 15). Despite that, the fact remains that this is a risk, as they may be incompetent in interpreting farming instructions and advice conveyed by Agricultural Extension Officers and all other service providers in the communal community. Also, the level of understanding of early warning advice for droughts and related events is compromised. As a result, a lack of education makes the community vulnerable, as they are unable to fully understand and correctly implement all necessary information rendered to them. Notably, it is encouraging and promising that 8% and 10% of household heads received some tertiary education (college and university) and tertiary education, respectively. Results further show that 9% indicated that they do not know the level of education of the head of the household (Figure 15).

4.3 Main source of household income

One of the variables collected by this study was information on the main source of individual household income and further determining the distribution of economic resources amongst the sampled population. It is for that reason that households were requested to clearly indicate their main sources of income from the list of possible sources. The study results portray that the majority of communal households (70%) rely mostly on pensions and other social grants to sustain their livelihoods, as presented in Figure 16. This result is highly supported by the fact that 64% of household heads are over 60 years of age. This makes them automatically eligible to receive a pension fund from the government, which is accorded to all senior Namibian citizens.

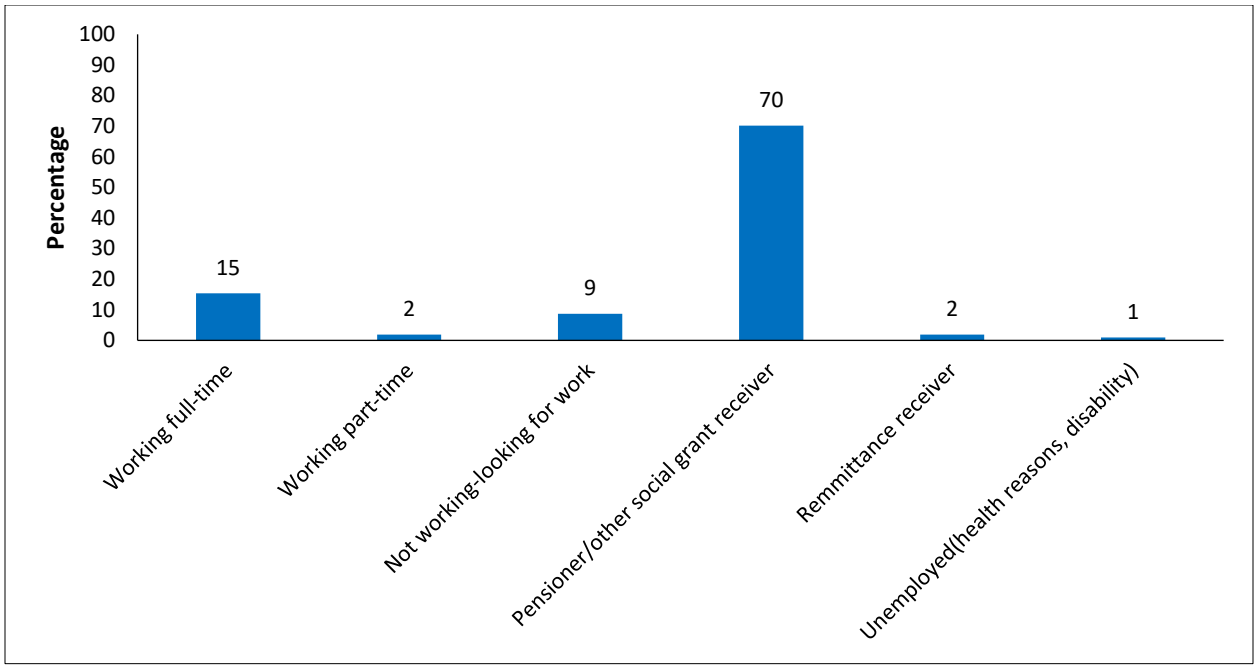

Figure 16: Main source of household income

The second source of income for interviewed households is the engagement of household heads in full-time employment (15%). Income from full-time employment is mainly associated with participation in day-to-day economic activities that operate in a strictly employment-related environment (NSA, 2015). Furthermore, it involves payments that are mostly received in cash or in kind. These payments are received by workers or in respect of their family members as a result of their current participation in remunerated employment or self-employment. Full-time employment is associated with several benefits, such as the ability to have a steady income every month, employee benefits, retirement and social security benefits, and employment advancement and personal growth in the long run.

4.4 Household asset ownership

4.4.1 Type of physical dwelling

Suitable housing is an integral component of all human livelihoods, health, and sustainable development. Access to decent shelter is extremely vital as it is associated with plenty of other areas of human livelihood; in fact, the majority of areas of human livelihood are fully attainable if a person has access to a decent shelter.

Reinforcing the above-mentioned statement by global agendas on access to shelter, the right to access decent shelter is, however, similarly acknowledged in the African Charter on Human and People's Rights. Housing is recognised in Goal 11 of the Sustainable Development Goals (SDGs), which focuses on sustainable cities and communities. Access to decent shelter is a fundamental aspect and epitome that provides a conducive environment for smallholder farmers to employ appropriate drought management mechanisms in terms of readiness and recovery.

All households interviewed by this study have a physical dwelling structure present, ranging from brick houses, corrugated iron houses, improvised housing units, and traditional dwelling structures. Figure 17 shows that the majority of households visited are made of traditional dwelling structures (43%). This study's findings are in line with the statistics of the Namibia 2011 Population and Housing Census under the distribution of households by the type of housing unit in relation to the political region. The 2011 Census statistics show that traditional dwelling structures are the most common dwelling type, making up 38% of all households in Namibia. They also make up the highest type of dwelling in rural communal areas (70%).

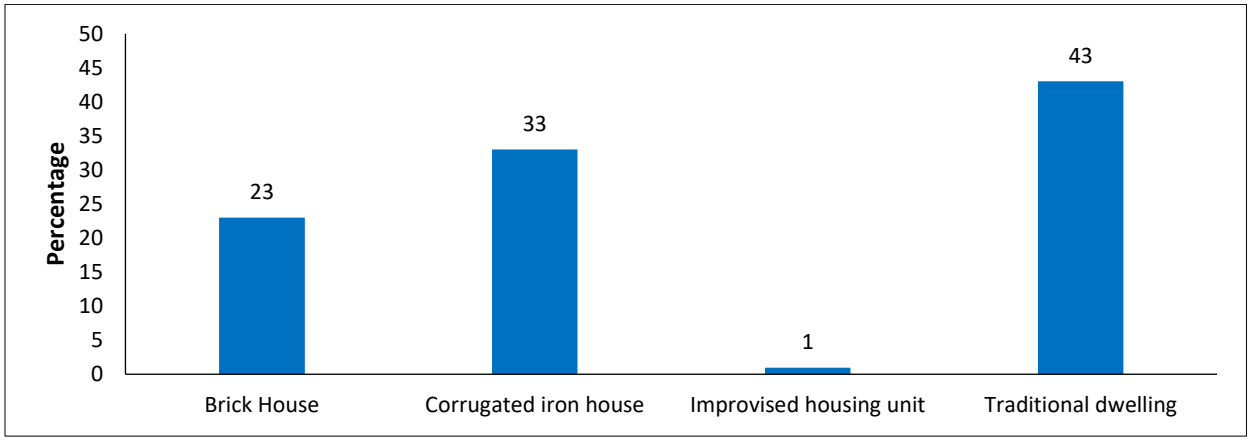

Figure 17: Type of physical dwelling unit

Narrowing down to the linkage to region-specific, traditional dwelling again makes up the highest type of dwelling type in Omusati Region, accounting for 85% (NSA, 2011). This is for obvious reasons, since the majority of houses in communal areas are made of traditional structures, as residents in rural communal areas value their culture, heritage, and tradition. Also, this is highly supported by the idea that most communal households' source of income is sourced from pension funds. Funds received from the GRN pension and other social grants are merely not sufficient for more household improvements but rather

sufficient to sustain the day-to-day operations of the household, such as buying food and other household necessities, covering medical costs, and paying for school fees. On the other hand, Figure 17 further shows that households made of corrugated iron sheets account for 33% of households interviewed, modern brick houses account for 23%, and only 1% reside in improvised housing units. Generally, study findings show that the housing establishment in communal areas is generally satisfactory, as it is rare to encounter community members not having access to a decent shelter.

4.4.2 Type of agricultural implements/equipment (light and heavy)

Since this study was conducted in communal areas where farming is practiced on a subsistence basis, communal households are expected to own or have access to the following agricultural implements and equipment: disc ploughs, mahangu threshers, chisels, spades, ridges, farm trailers, tractor loaders, fertiliser spreaders, tractors, draught animal powers, weeding hoes, and cultivators. It is for that reason that this study assessed the ownership level in terms of agricultural implements and equipment per household.

Charamba, Bello and Shiimi (2021) explained that the type of agricultural implements owned by smallholder farmers, in most cases, determines the type of drought readiness and recovery strategy the household will employ. Smallholder farmers who have access to modernised agricultural implements tend to employ modern drought coping measures, as opposed to smallholder farmers who employ indigenous practices, even though all these practices complement each other. Figure 18 shows that the most dominant agricultural equipment is the weeding hoe, as indicated by 89% of households. This is strongly supported by the fact that almost all communal households own and make use of weeding hoes to weed and cultivate crop fields during the crop-growing season.

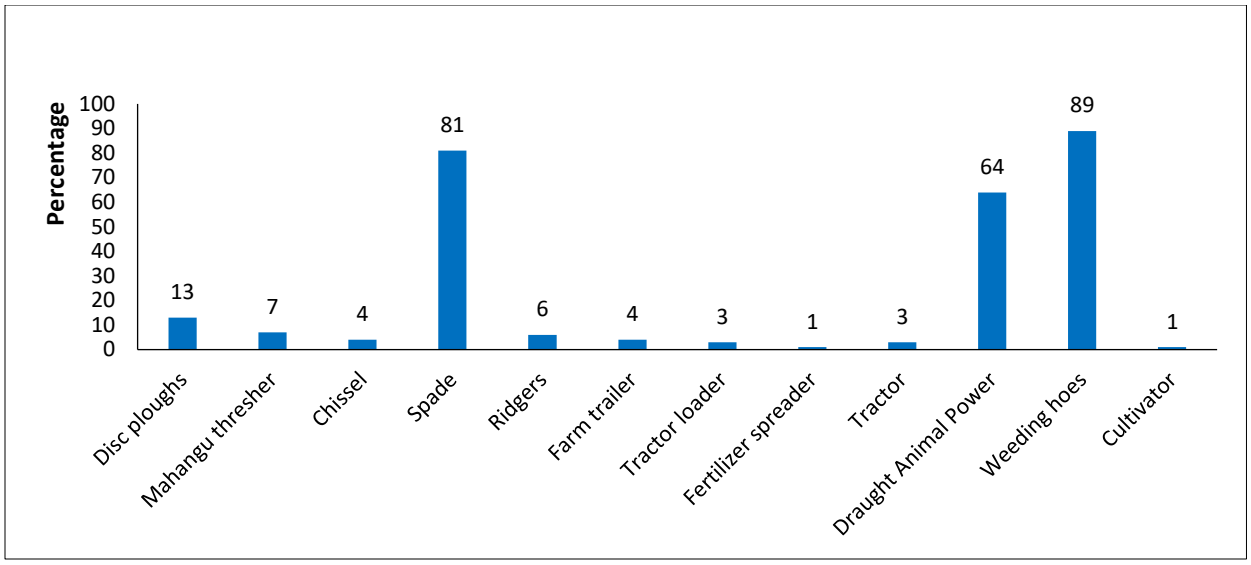

Figure 18: Types of non-agricultural implements and equipment owned by households

These findings are strongly supported by the results of the Namibia Census of Agriculture (2013/14) of the communal sector, whereby cultivating hoes were recorded to be mostly owned by communal households (NSA, 2015). Since spade is a must-have piece of equipment in households, it emerged as the second-highest piece of equipment, as indicated by 81% of households. Draught animal power ownership emerged with a significant number, as specified by 64% of households in communal areas. This is old-fashioned implement that was adopted by past generations and is commonly preferred by communal farmers to plough crop fields. In addition to that, it is generally pulled by donkeys or oxen to plough crop fields, supplemented by tractors that are fairly high-priced and too expensive to render ploughing services to all households in the community; therefore, financially sound households opt for this particular service, while financially challenged households employ the draught animal power.

It is interesting to learn from the findings of this study that 7% of households own mahangu threshers that are basically used to separate mahangu grains from the head. This process is conceded by winnowing to obtain fresh and clean grains. Mahangu threshers have since replaced the olden traditional method adopted by past generations of sorting out mahangu grains from the head by means of wooden sticks. Households that do not own or have access to mahangu threshers indicated that they source their threshing services from community members in the position of threshers. This is done because owning such an implement is expensive for the majority of households. Interestingly, 13% of households indicated that they have disc ploughs that are normally connected to the tractor for ploughing crop fields. Most

farmers with disc ploughs mostly own tractors that render ploughing services to the community either privately or registered for the GRN-subsidised ploughing services.

4.4.3 Type of non-agricultural implements or equipment

Due to the diverse ownership of household implements and equipment, the study also focused on establishing the number of non-agricultural implements present in communal households. Communal households are expected to own or have access to the following non-agricultural implements and equipment: axe, wheelbarrow, concrete mixer, donkey cart, welding machine, and generator.

These implements and equipment are necessities for every household as they are used for day-to-day household operations. Bielek (2015) indicated that the presence of non-agricultural implements at the household level within the smallholder setup is key in defining and determining the socio-economic status of smallholder farmers. Ownership or access to non-agricultural implements in the agricultural setup, especially in smallholder farming, assist with the capacity, especially financial power. This help to employ certain drought coping strategies applicable in specific scenarios. As expected, Figure 19 shows that 89% of households indicated that they own an axe, which emerged to be the most owned piece of equipment as households use it to cut down trees and slice firewood. The majority of households' use an axe to cut firewood since they are not electrified. Another supporting reason is that most households are traditional types, and the presence of an axe explains a lot, as most inhabitants' use the axe to cut trees to create poles for fence erection and the building of communal households.

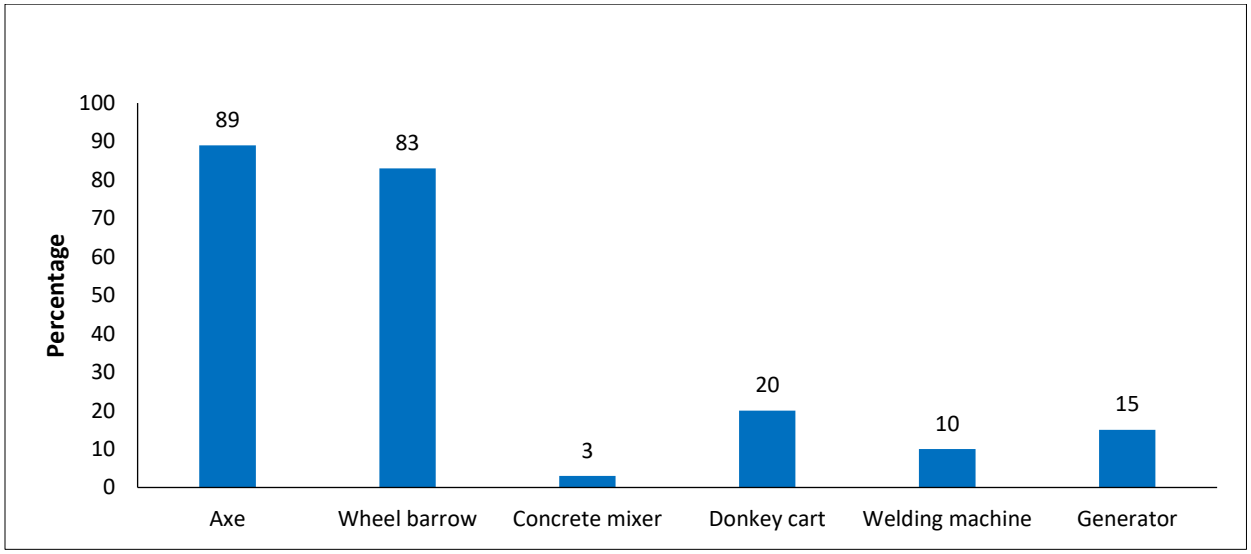

Figure 19: Type of non-agricultural implements or equipment owned by households

Figure 19 further shows that 83% of households own a wheelbarrow. This option emerged with the second-highest ownership status among households, as it generally serves the role of transportation of heavy loads in construction and items around the household. Interestingly, study findings show that 20% of households own a donkey cart, and they specified that it provides an important form of affordable means of transportation for communities in communal areas by transporting necessities such as wood and water. Donkey carts normally convey people from one village to another, village water sources, health facilities such as constituency clinics, and means of transportation for children to and from school. Donkey carts are common in rural communal areas from southern to northern and eastern to western Namibia; hence, they are appropriate for rural areas in Africa.

4.5 Agricultural production (livestock and crop production)

4.5.1 Size of agricultural land occupied by the household against the size of arable land under agricultural production

The size of agricultural land occupied by the household was compared against the size of arable land under agricultural production annually. This analysis was aimed at determining the level of extent and correlation of the parameters involved and the extent to which the entire occupied land by households is utilised for agricultural production, mainly crop production. Cross-tabulation results in Table 7 show that the majority of respondents (52%) with their customary land in the category of 0–5 hectares indicated that, of the land occupied by their households, all 52% of respondents indicated that the specific land is used for agricultural purposes (mainly crop production) that falls within the range of 0–5 hectares. Furthermore, the results show that 30% of respondents indicated that of the land that is occupied by their household, 26% cited that it falls within the category of 0–5 hectares, while 4% indicated that agricultural land falls within the category of 5–10 hectares.

Study findings in Table 7 show that most of the customary land sizes occupied by households in communal areas are in the range of 0–20 hectares as per the provisions of the Communal Land Reform Act, Act No. 5 of 2002. Provisions of the said Act indicate that a customary land right parcel that exceeds 50ha will be referred to the Minister of Agriculture, Water and Land Reform for his written approval for registration. As a prerequisite, prior to submitting the land parcel application for consideration, the applicant and the

respective Traditional Authority will be required to submit a motivation letter that will supplement the application to the Minister (Meijs & Kapitango, 2012).

Table 7: Cross-tabulation of the size of agricultural land occupied by households against the size of arable land under agricultural production

		Size of arable land under agricultural production (hectares)				Percentage of households
		0-5	5-10	10-15	20-25	
Size of agricultural land occupied by the household (hectares)	0-5	52	0	0	0	**52**
	5-10	26	4	0	0	**30**
	10-15	4	4	2	0	**10**
	15-20	1	5	0	0	**6**
	25-30	1	1	0	0	**2**
	30 and more	0	0	0	1	**1**
Total percentage of households		**84**	**14**	**2**	**1**	

Table 8: Chi-Square test results of the size of agricultural land occupied by households against the size of arable land under agricultural production

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	166.559[a]	15	**.000**
Likelihood Ratio	59.180	15	.000
Linear-by-Linear Association	46.219	1	.000
N of Valid Cases	104		
a. 19 cells (79.2%) have an expected count less than 5. The minimum expected count is .01			

The p-value in Table 8 is < 0.05; hence, there is sufficient evidence to conclude that the results are statistically significant. We therefore conclude that a relationship exists between the size of agricultural land occupied by households (hectares) and the size of arable land under agricultural production (hectares). As per the results in Table 8, it signifies that there is a statistical relationship amongst the two tested variables.

4.5.2 Leasing of land for agricultural purposes

Communal households were interviewed to determine if they are involved in leasing portions of their customary land rights to other individuals in the community or beyond, mainly for business-oriented purposes and activities in the field of agriculture. Communal households closer to all-year-round water

sources, such as the common water canal, have converted portions of their fields that were initially earmarked for pearl millet and other crop production into horticultural production for business-oriented purposes. It is worth noting that out of the 104 respondents interviewed, only 3% specified that they are actively engaged in leasing portions of their customary land rights for agricultural purposes, as displayed in Figure 20.

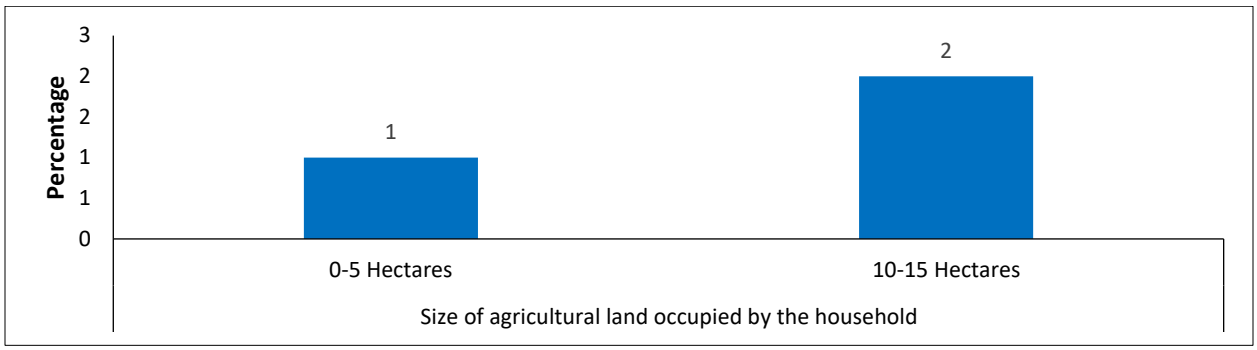

Figure 20: Size of land leased for agricultural purposes

Concerning the size of land leased, 1% is within the category of 0–5 hectares, while the remaining 2% lies within the category of 10–15 hectares. These communal households stated that they are merely driven by rising poverty, unemployment and the fulfilment of essential obligations to lease portions of their customary land rights to business individuals who are mainly interested in horticultural production that involves the growing of horticultural crops on a large scale. Communal households further cited that they earn monthly income in the form of monthly rentals to sustain their households and livelihoods, like paying educational fees, providing health services, and buying essential household necessities (food and clothing). Out of the pre-generated categories, there is no agricultural land leased by smallholder farmers in the following categories of hectares: 5–10, 15–20, 20–25, 25–30, and 30 and beyond.

4.5.3 Production levels for different types of crops grown

Communal households in rural areas are mainly engaged in livestock and crop production on a subsistence basis, whereby the food produced and livestock reared are mostly for household consumption and only a few are normally marketed. According to Mendelsohn, Shixwameni and Nakamhela (2012), communal land uses differ from area to area mainly because of disparities in soil quality and types of vegetation. Inhabitants in communal areas normally have clearly defined households with land parcels for crop production. In some regions of northern Namibia, there are large parcels of commonage areas that are

predominantly earmarked for common grazing and harvesting of plant products and by products such as wood (timber), wild fruits, firewood, and thatch grass (Mendelsohn, Shixwameni & Nakamhela, 2012). Furthermore, the main staple food crops grown annually are pearl millet, maize, and sorghum, while a few horticultural projects growing vegetables are emerging in the area.

An analysis of the yearly production of crops and vegetables was performed. Results in Figure 21 show that mahangu is the staple food for northern communal households, as its production significantly dominates across all levels of measurement except in the range of 0–499 kilogrammes.

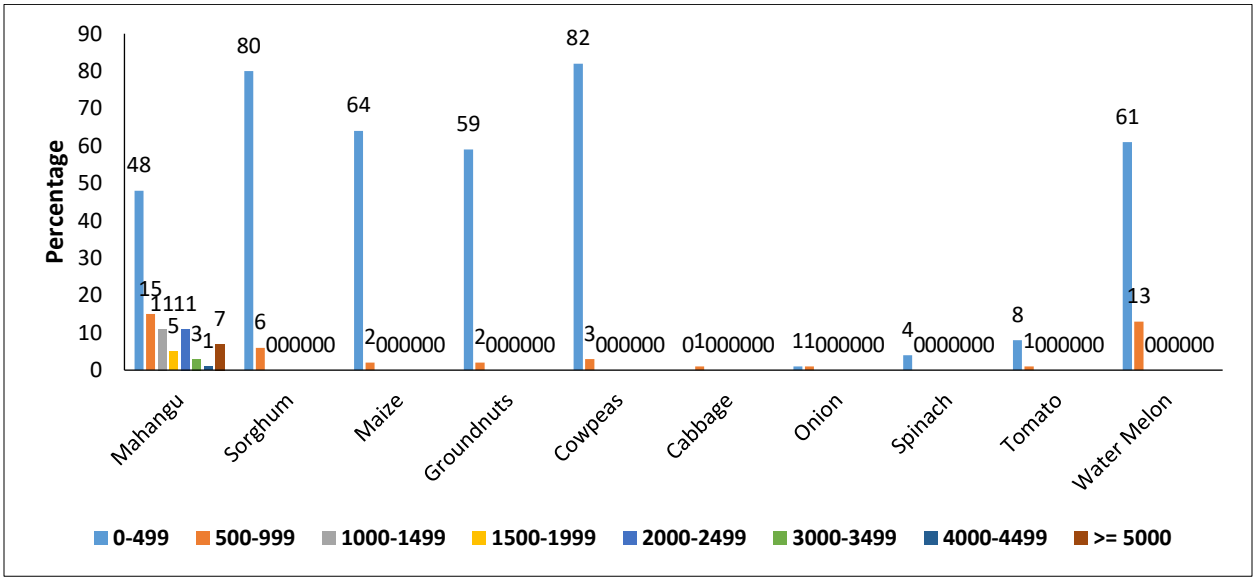

Figure 21: Average annual production levels of crops by households in kilogrammes

Results further show that 48% of households specified that their yearly production falls between 0 and 499 kilogrammes, while 15% of households specified that their yearly production falls between 500 and 999 kilogrammes. Interestingly, 38% of households are noted to be impressively taking mahangu cultivation seriously, as their significant yearly production falls between 1000 and >= 5000 kilograms. The results of the analysis in Figure 21 visibly illustrate that, apart from growing mahangu, households in communal areas have embraced the new revolution and diversification of crop production that involves the integration of horticultural production and gardening by means of backyard garden establishments and the establishment of horticultural projects on land portions of crop fields. These initiatives have been gaining momentum in communal areas over the past years with technical and financial support from several institutions, such as the Ministry of Agriculture, Water and Land Reform, Agricultural Bank of

Namibia, the Namibia Agronomic Board, the Environmental Investment Fund, nongovernmental organisations, and donors (FAO, 2019).

Figure 21 further confirms that crops such as watermelons, sorghum, cow peas, maize, and groundnuts normally attain a significant yearly yield in kilogrammes in a normal rainfall season. Nevertheless, findings show that horticultural vegetables like cabbages, onions, spinach, and tomatoes were not significantly produced, as these are viewed as complementary crops, and they are mainly produced to supplement existing crop production by means of dietary equating and marketing with the aim of earning extra household income. It is praiseworthy that households are adopting the approach of backyard garden establishment within the parameters of their households, as this addresses the issue of food security at the rural household level.

4.5.4 Marketing of crops and vegetables

Marketing crops and vegetables produced by communal subsistence farming is key to ensuring that communal farmers producing on a large scale or those willing to market their agricultural produce have access to the market. Some farmers are encouraged to market because of surplus harvests in a particular growing season. Figure 22 shows that almost all respondents (99%) interviewed cited that portions of crops and vegetables produced are basically for household consumption, while in the same vein, 80% stipulated that they do not market their crops and vegetables. This means that they keep them for household use. This is attributed to the fact that most households depend on crop fields primarily for their survival.

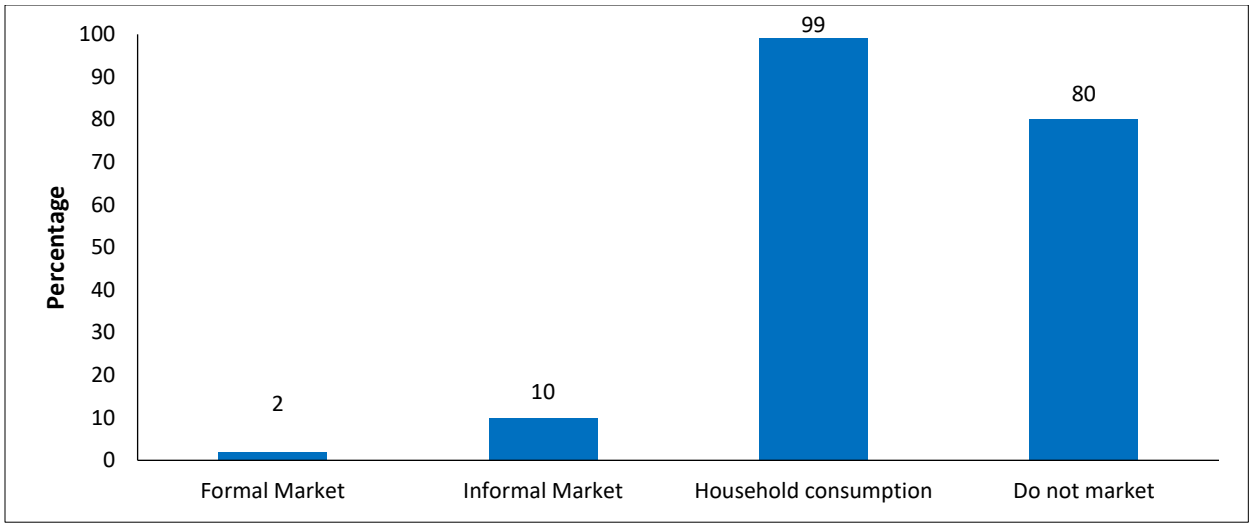

Figure 22: Marketing of crops and vegetables

Communal households, as displayed in Figure 22, expressed their concerns about marketing as they preserve harvests from previous seasons to cater for future prospects related to natural calamities that may arise, such as drought events, as they are common recently. Notably, 12% of communal households are engaged in the marketing of their crops and vegetables to raise money that will continuously assist with improving their overall livelihoods. As displayed in Figure 22, the majority of communal households that are marketing crops and vegetables opt for informal markets as there is a lack of formal markets in communities. Communal farmers who are willing to opt for formal markets cited the cost implications involved, such as the transportation of crops and vegetables to the nearest towns.

4.5.5 Current number of livestock owned

Livestock ownership is considered a movable wealth by households that is mainly utilised for household-related activities such as farming purposes, slaughter for feeding, means for income generation, and cultural ceremonies such as wedding gifts (Mtetwa, 2018). Furthermore, livestock are important as they are considered assets for most communal households, less so than land (tenure security-customary and leasehold land rights in communal areas). It is very common that most people will view poor communal households as mainly categorised by the presence of small livestock and the rearing of poultry, as they are relatively easier to obtain and manage. Figure 23 illustrates the proportion of households owning different types of livestock. The study notes that livestock owned by communal households are cattle, sheep, goats, poultry, pigs, horses, and donkeys.

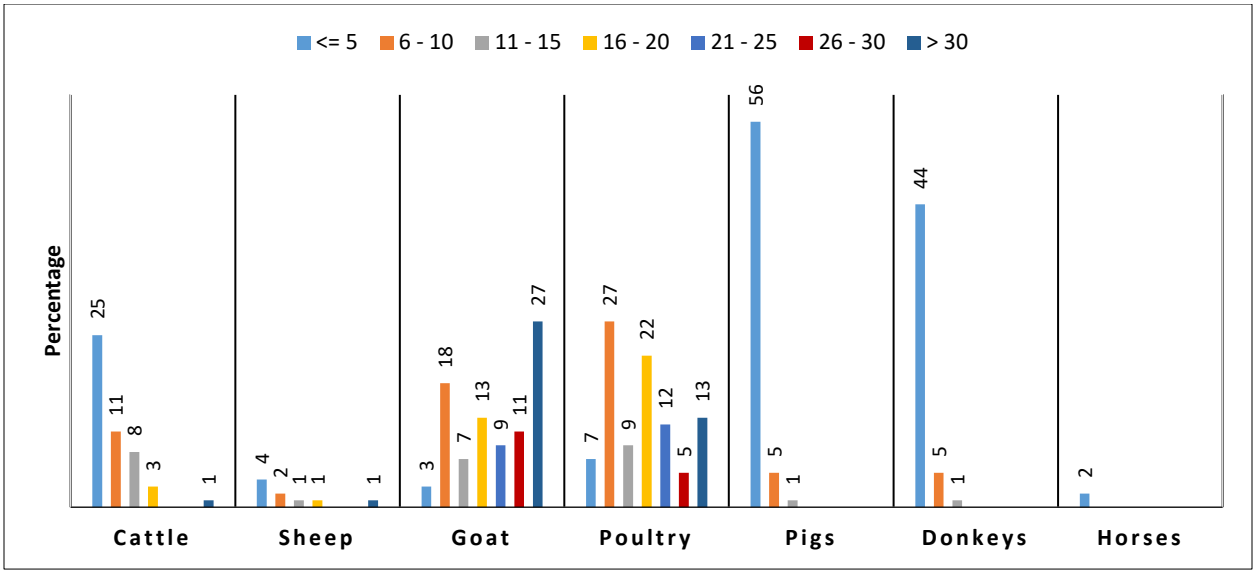

Figure 23: Proportion of households owning different types of livestock

Results show that 48 households keep cattle, of which 25 households keep a number of cattle ranging from 0–5, and only a single household significantly owns a herd of 30 and more. Households narrated that they keep cattle mostly for status, marketing, meat, milk, hides, gifts at weddings and funerals, and serve as key in animal draught purposes, especially ploughing. Sheep are mostly kept for meat, gifts for weddings and other joyful ceremonial events, and status in society. Results show that 9 households keep sheep, of which the majority (4) owns a number of sheep that ranges from 0–5. Goats are mostly reared for status, meat, milk, and gifts for weddings and other joyful ceremonial events. Figure 23 displays that 88 households keep goats, of which the majority (27) are keeping the number of goats that falls within the range of 30 and above, while 3 households indicated that they only keep a number of goats between the range of 0–5.

Poultry, which comprises chickens, guinea fowl, ducks, and doves, is mainly kept for household consumption. Study results show that 95 households keep poultry, of which 27 households keep a good amount of poultry that ranges from 6 to 10. Still on poultry, 13 households indicated that they keep a good deal of poultry, ranging from 30 poultry, and above. Households specified that they keep pigs mainly for marketing and household consumption purposes. Results show that pig farming is practiced by 62 households, of which the majority (56) keep a low number of pigs ranging from 0-5, since pig farming requires high attention in terms of feed, while it was observed that only a single household keeps a number of pigs in the range of 11–15. Donkeys and horses play a key role in animal drought purposes

(animal draught plough in the ploughing of fields and pulling of donkey carts). Figure 23 shows that 50 households keep donkeys, of which the majority (44) keep a number of donkeys in the range of 0–5. The presence of horses in communal areas was minimally observed, as only 2 households are keeping horses, and within the range of 0–5.

4.5.6 Livestock marketing

In the communal areas of Namibia, livestock farming continues to be more of a tradition than a business. Livestock farming, especially in the rural farming system, has the potential to ensure that food security is achieved at the household level as it has the ability to provide income. This income will address poverty, particularly in poor communities in rural areas (Togarepi, Thomas & Kankono, 2016). Moreover, livestock farming is key for economically defied households in rural areas as it is the source of milk and meat and supplementary by-products such as hides and horns, which generate household income necessary to cater for household financial needs like medical expenses, school fees, and other essential household expenses (Togarepi, Thomas & Kankono, 2016).

Figure 24 shows that the majority of households specified that they do not market their livestock (76%), which means they are for household uses, which means they keep them for household consumption and status (98%). This is necessitated by the fact that livestock ownership is highly regarded as a symbol of wealth and a reputable and respected social status in the community. Livestock supplements the existing food supply, particularly if there is any crop failure experienced in situations of natural disasters such as droughts and floods.

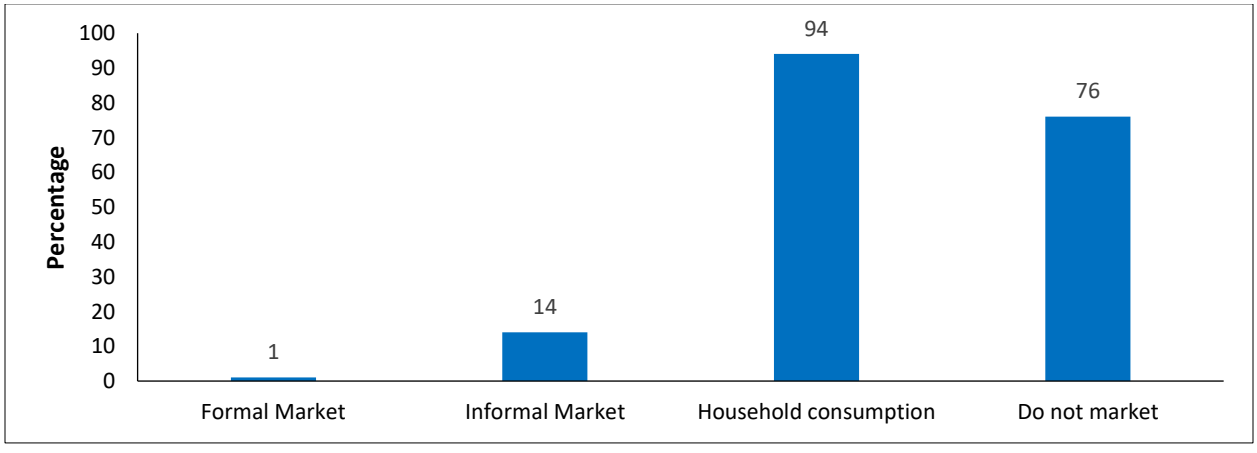

Figure 24: Livestock marketing

Additionally, communal households' further stated that livestock ownership acts as collateral against natural disasters, a source of manure for crop fields, and an essential source of ox/donkey-draught power for cultivation of crop fields and transportation. Cattle farming is key in socio-cultural practices as it is normally used as a bride price at traditional weddings and to settle disputes (as a fine as per the customary law administered by traditional authorities) in communal areas. Households' not marketing livestock further cited that cattle in particular are reserved for special ceremonial gatherings such as weddings and funerals.

As per the results in Figure 24, the majority of communal households that are marketing their livestock opted to market their livestock in the informal market set-up (14%) rather than the formal market set-up (1%). This is basically performed to strengthen relationships (friendship) among communal farmers; payment transactions are easy, and the lack of reliable information on formal market procedures drives communal farmers to opt for informal markets instead. Some households cited that the lack of information pertaining to market access hinders them from marketing their livestock. There is a need for the Ministry of Agriculture, Water and Land Reform to guide and provide all necessary information pertaining to procedures related to market access. Lessons learned from the experiences of the 2018/19 agricultural drought and the high livestock mortalities experienced should serve as a lesson for future planning. Households are advised to rear a reasonable number of livestock that they are able to sustain and maintain in cases of drought events.

4.6 Impact of drought

4.6.1 Duration of the 2018/19 agricultural drought

As per the findings in Figure 25, the majority of respondents (83%) perceived that the 2018/19 agricultural drought duration lasted for a period of 8–12 months. These findings are supported and in line with the findings of the study by Shikangalah (2020), as the results show that, from the onset of the rainy season towards the end of 2018 that stretches into 2019, the overall rainfall across Namibia was extremely poor. This rainy season was associated with sporadic and erratic rainfall patterns that are accompanied by scorching high temperatures and evaporation, leading to low soil moisture levels.

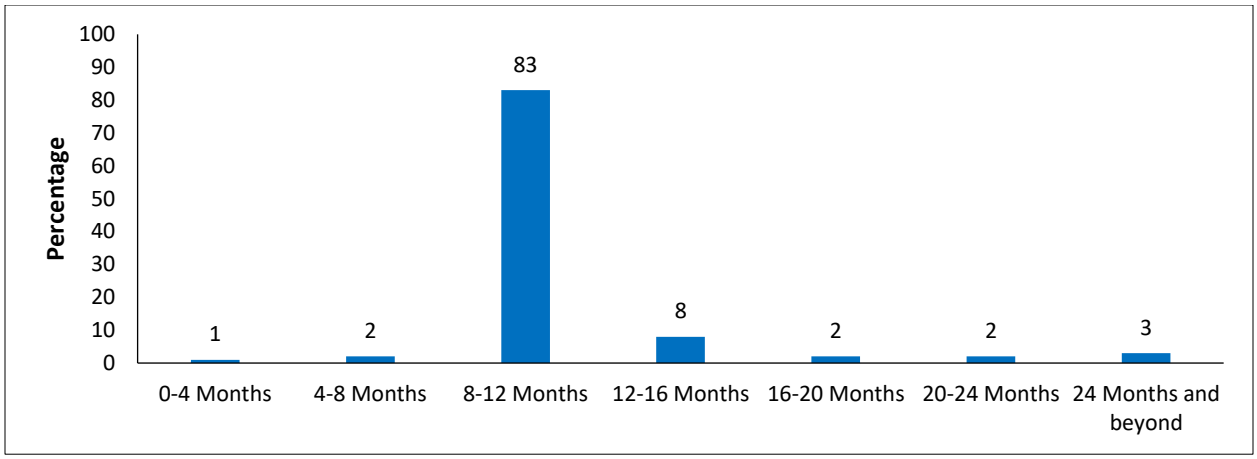

Figure 25: Duration of the 2018/19 agricultural drought in the community

Notably, 8% of interviewed respondents described and felt that the duration of this particular drought lasted for a period of 12–16 months (Figure 25). Linking the most selected duration of the 2018/19 drought to the set of defined drought duration categories, this particular drought under review can be classified as a long-term drought. This particular drought was mainly associated with a lengthy period of high crop failure and livestock mortalities, which adversely impacted the socio-economic well-being and livelihoods of several households in rural areas, specifically those that solely depend on subsistence farming as their source of living.

4.6.2 Grazing conditions prior to and during the drought

Drought is mainly associated with poor grazing for livestock, which is instigated by the poor rainfall received. Little to no rainfall may lead to the death of existing vegetation and limit the growth of new grass and forage for livestock. This study assessed the grazing condition in the study area before and during the drought event. The interpretation of the study results is divided into two sections, whereby the first interpretation focuses on the grazing conditions before the 2018/19 agricultural drought, while the second interpretation focuses on the conditions of the grazing during the drought event in the community. Firstly, prior to the occurrence of the drought, the study findings as displayed in Figure 26 demonstrate that the majority of households specified that the grazing condition in the community before the drought was average (49%) and that the quantity and quality of forage available were fair and reasonable. Furthermore, 35% of households rated grazing conditions as good.

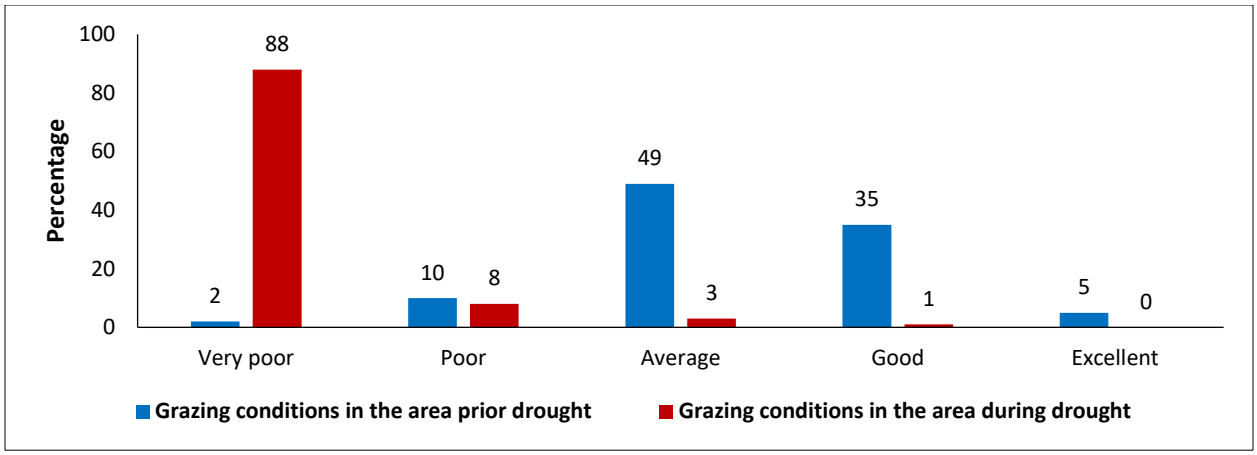

Figure 26: Grazing conditions in the area before and during the drought

Secondly, Figure 26 further presents the views of communal households on the grazing conditions during the drought event. Results show that most communal households (88%) rated that the grazing conditions in the community were very poor, as minimal rainfall was received. Minimal rainfall was the contributing factor to the deterioration of the quantity and quality of forage in commonage grazing areas, as well as private customary land rights. Findings in Figure 26 on the poor grazing conditions during the drought event resonate with the assessment findings of the Agricultural Input and Household Food Security Situation report by MAWF (2019), which reported that overall grazing conditions worsened severely in many parts of Namibia after the severe drought event. The MAWF (2019) further stated that the worsened grazing was prompted by a heavy delay in rainfall. It is for that reason that the majority of communal farmers were hit by high livestock mortalities as a result of poor grazing and water.

4.6.3 Water situation prior to and during the drought

Poor rainfall received during drought events is mainly the leading cause of the low availability of water for livestock and human consumption, industry, and irrigation in agriculture. Low water inflow results in minimal recharging of acquirers and other water sources that play a major role in supplying water to communities, particularly in communal areas. This study assessed the water situation in the community of Outapi Constituency before and during the drought event. The interpretation of the study results is divided into two sections, whereby the first interpretation focuses on the water situation before the drought under review, and the second interpretation focuses on the water situation during the drought event in the community.

Firstly, prior to the occurrence of the drought, the study findings, as displayed in Figure 27, demonstrate that the majority of households expressed their satisfaction with the water situation as good (49%). Respondents further narrated that water availability in the community was not a significant challenge, as access to water was readily available.

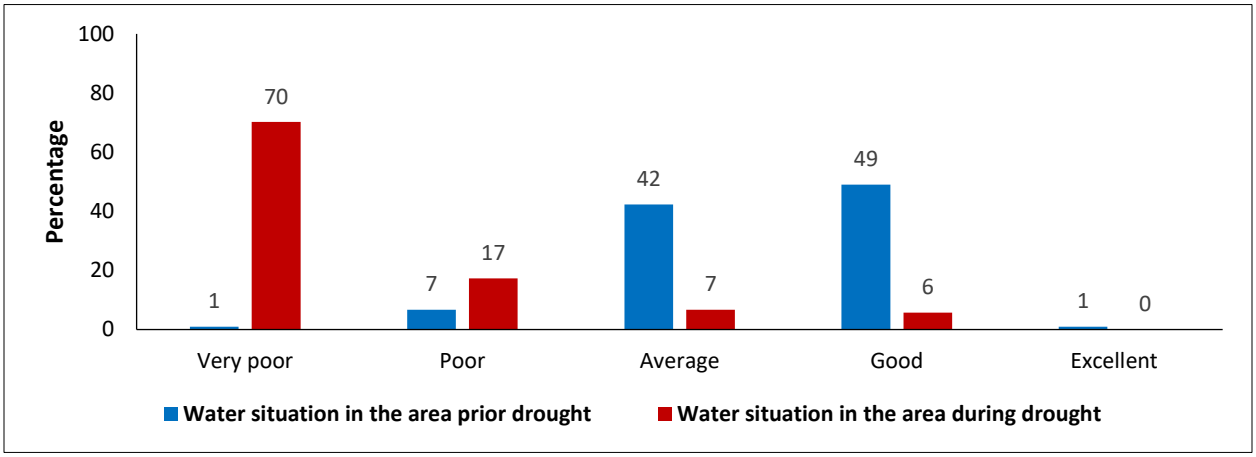

Figure 27: Water situation in the area before and during the drought

Secondly, Figure 27 further presents the views of communal households on the water situation during the drought event, whereby results show that most communal households (70%) specified that the water situation was very poor during the drought as most water catchment areas and available water sources dried up. These findings are in line with and supported by the findings of the 2018/19 agricultural drought overview by Shikangalah (2020) and assessment by MAWF (2019), whereby both authors specified that the overall water supply situation was a serious challenge across Namibia during the drought event. They further specified that minimal access to water supply was reported in a few remote areas of the northern-central regions, such as Ohangwena, Omusati, Oshana, and Oshikoto that most natural water catchments received minimal water inflow in the 2017/18 rainfall season. This has forced many communal households to primarily depend on pipelines, human-made wells by the community, and drilled boreholes by the Ministry of Agriculture, Water and Land Reform to constantly supply adequate water to livestock, but this was a costly exercise.

4.6.4 Crop production losses prior to and during the drought

Households were accorded the opportunity to rate the extent of crop production losses, particularly rain-fed crops, before and during the drought event. The interpretation of the study results is divided into two

sections. The first interpretation focuses on the crop production losses before the drought under review. The second interpretation focuses on the crop production losses during the drought event in the community.

Firstly, Figure 28 shows that prior to the occurrence of the drought, 66% of communal households specified that crop production losses were moderate. This is supported by the fact that the intensity of the drought was still in the prime phase and not very severe. At this stage, communal households were still optimistic and hopeful that a harvest would be attained after the GRN, through the Ministry of Agriculture, Water and Land Reform assisted households with subsidies. These subsidies were aimed at assisting crop-producing households in communal areas to afford agricultural inputs and services while addressing food security at the rural household level (MAWF, 2019).

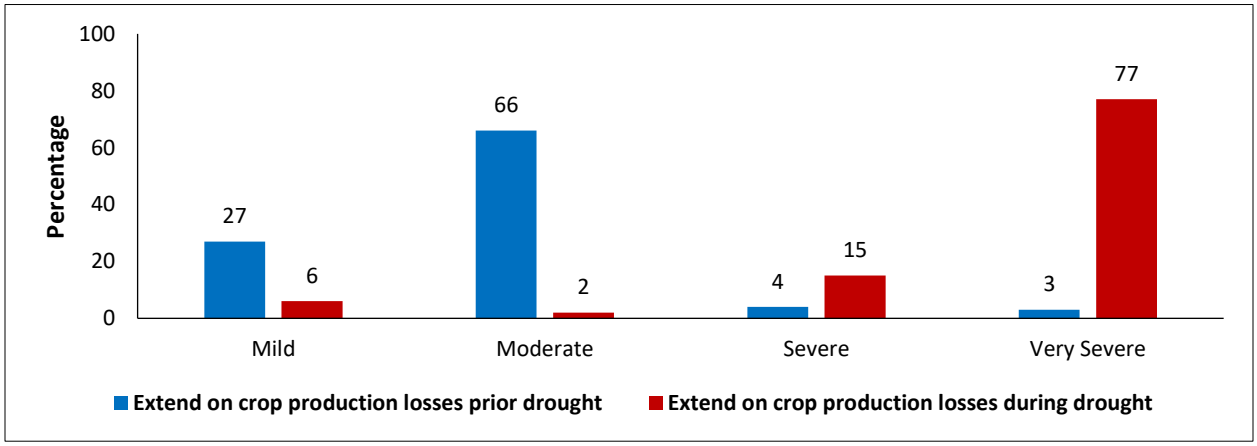

Figure 28: Extent of crop production losses before and during the drought

Furthermore, the Ministry clearly specified that all subsidy services were limited to an area not exceeding 5 hectares per household, and subsidies are as follows: (1) government tractor subsidy; (2) ploughing subsidy services; (3) seed and fertiliser subsidy; and (4) weeding subsidy services. Secondly, communal households endured crop production losses during the drought event, and the majority of households (77%) expressed their disappointment with the production losses they endured. Respondents further rated that the extent of crop production losses during the drought was very severe, and they did not attain any crop production harvest during that particular crop growing season (Figure 28).

4.6.5 Livestock mortalities during the drought

Existing literature reviews on the impact of the 2018/19 agricultural drought in Namibia clearly indicate that the 2018/19 agricultural drought in Namibia was the worst drought event that has happened in 90 years. This particular agricultural drought was reflected as more serious than the 2012/13 drought, which was reported as the worst in 30 years (Liu & Zhou, 2021). Study findings that emanate from this study, as displayed in Figure 29, confirm that interviewed households rearing livestock in particular suffered high livestock mortalities ranging from cattle, sheep, goats, pigs, poultry, donkeys, and horses.

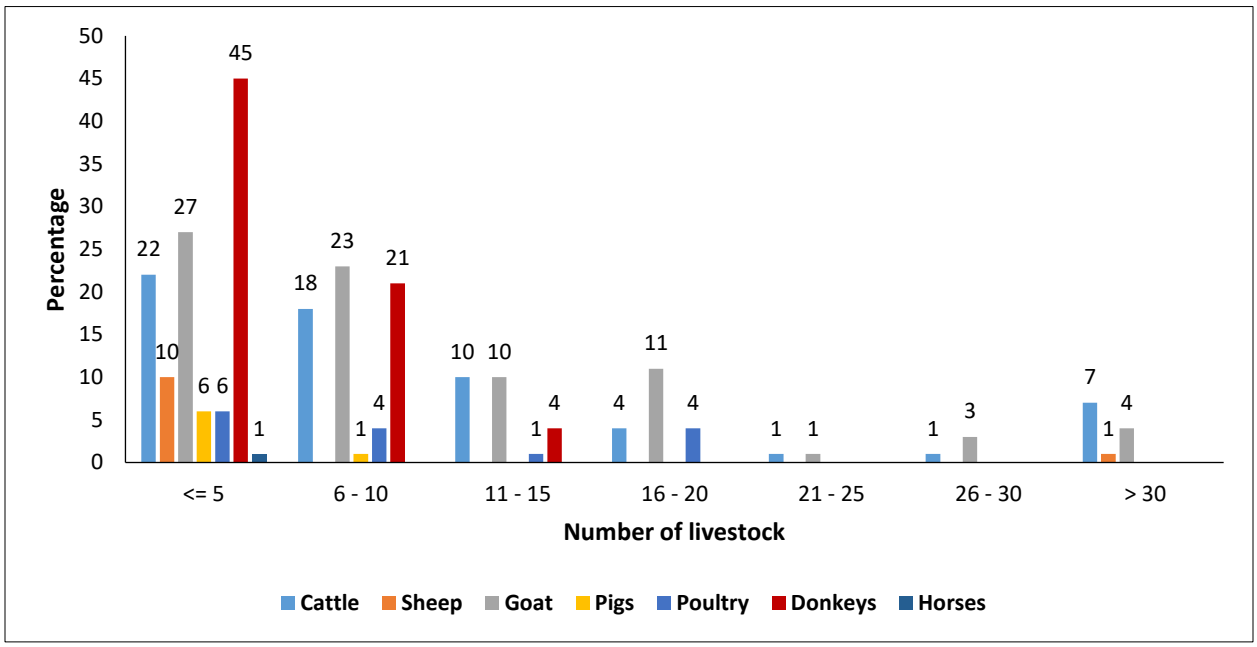

Figure 29: Proportion of households that lost livestock due to drought

Moreover, study findings are supported by livestock mortality figures as reported in Table 1, whereby the Omusati region endured the highest livestock mortalities in communal areas as opposed to other regions in communal areas as well. As per the results in Figure 29, the livestock mortality range that is dominating is for households that lost less than five livestock (all kinds of livestock). This is reinforced by the fact that most communal households do not keep large herds of livestock on their customary land. This is because the land, especially commonage and areas within the parameters of the homesteads, has minimal potential for sustaining a large volume of livestock. It is for that reason that most households have additional land parcels that are situated in remote, hostile, and uninhabited areas in the Omusati region, such as Omakange, Otjetjekua, Amarika, and Ohamayongwe. These places are isolated and located far away from the main homesteads. Livestock-rearing households set up structures in these remote areas

that are mainly reserved for grazing. Normally, a maximum of two cattle headers are employed on a full-time basis to secure the area, look after livestock, and ensure that all activities relating to livestock management are performed. Nevertheless, the results still show that there are households that experienced high livestock mortality (cattle, sheep, and goats) in the range of 30 and above.

4.6.6 Impact of drought on the environment

Respondents gave their perspective on the negative impacts of drought on the environment. Figure 30 shows that an overwhelming majority of 98% of respondents asserted their views that the drought has a negative impact on the environment, and only 2% affirmed that they do not think the drought has a negative impact on the environment.

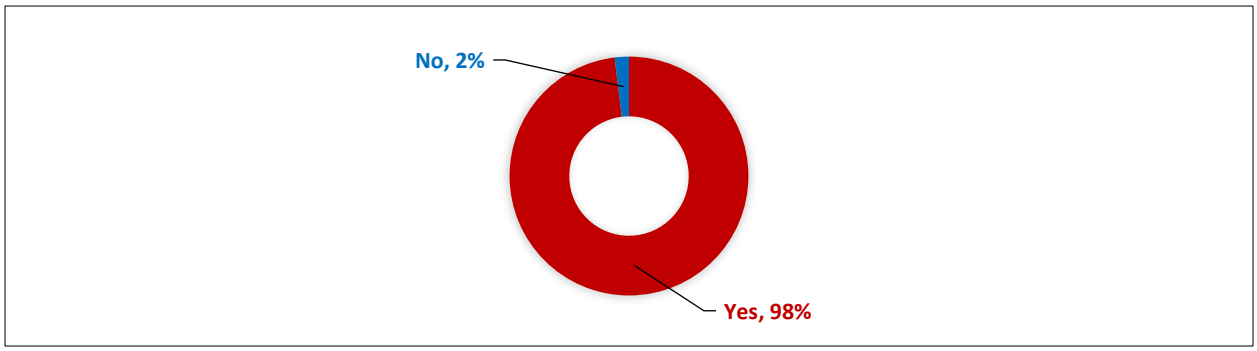

Figure 30: Household views on the impact of drought on the environment

Responses as displayed in Figure 30 show that a large proportion of interviewed households are knowledgeable individuals who are well conversant with information relating to ecological consequences associated with drought. All respondents who specified that they believe that there are negative impacts associated with droughts were further requested to select the exact negative impacts triggered by droughts. In most cases, drought manifestation always leads to land and water resource degradation, and this has a significant impact on the environment. Marie and Li (2022) believe that drought does not mainly lead to water shortages for humans but negatively impacts the existence of wildlife. Biodiversity in the ecosystem primarily depends on the existence of forests and other vegetation types and water sources (Marie & Li, 2022).

As per the findings of this study, Figure 31 clearly exhibits that the majority of households (91%) specified that the main impact of drought on the environment in the community was the lack of drinking water for

livestock and human consumption. These findings resonate with the results of a study by Shikangalah (2020) and the assessment by the MAWF (2019), as they all cited that water levels in the most essential water sources in the community, such as earth dams and boreholes, were critically low and drying up. There was little inflow of water received during the 2018/19 rainfall season compared to the 2017/18 rainfall season following poor rainfall; hence, this negatively impacted the underground water table. Particularly in most areas of the Omusati region, the water supply situation was a serious concern, as the majority of human-made earth dams were completely dry and most households depended mainly on pipeline water (Namwater rural water supply), natural wells, drilled boreholes, and the Ruacana-Oshakati water canal to access water.

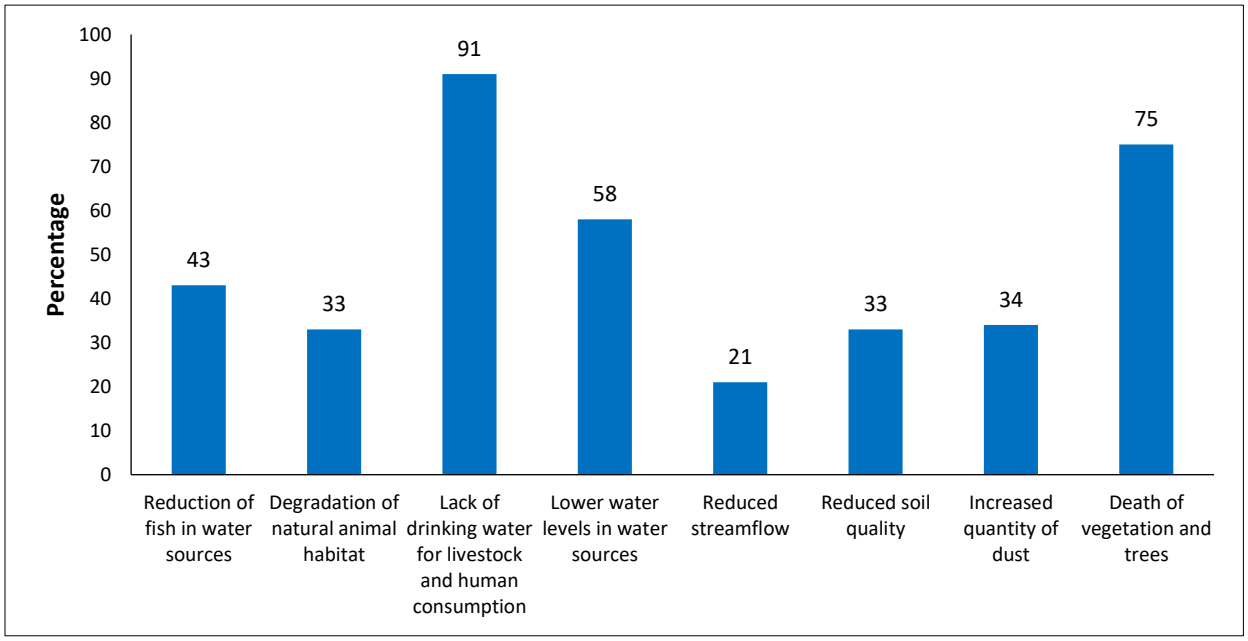

Figure 31: Impact of drought on the environment

Another striking finding that emanated from this study on the environmental impact associated with drought is the death of vegetation and trees (75%), mainly because of the lack of water that was widely experienced in the community (Figure 31). In this case, most households specified that the death of vegetation comprises the wilting and dying of field crops (pearl millet, sorghum, maize, groundnuts, watermelons, and beans) that were grown from the onset of the growing season.

Notably, respondents revealed other environmental impacts, such as a reduction in water levels in water sources (58%), which is mainly associated with low precipitation. Other environmental impacts are the

reduction of fish in water sources (43%) mainly linked to poor inflow of water in streams and lack of breeding habitants for fish kind; increased quantity of dust (34%) that is nurtured by the dry spell, especially the topsoil that is exposed to heavy wind; degradation of natural animal habitants (33%) as vegetation where animals seek refuge and as breeding hosts dries up and eventually dies; and reduced soil quality (33%) as the topsoil that is rich in plant-growing nutrients is blown away by wind.

4.7 Drought readiness strategies

4.7.1 Type of early warning systems

Results from this study show that the majority of households specified that the early warning system and related information are communicated to the community by means of local radio stations (88%) (Figure 32). This is supported by the fact that most households own or have access to a radio or cell phone with radio stations. Most communication at the constituency, regional, and national level is conveyed to the community by means of this technological platform.

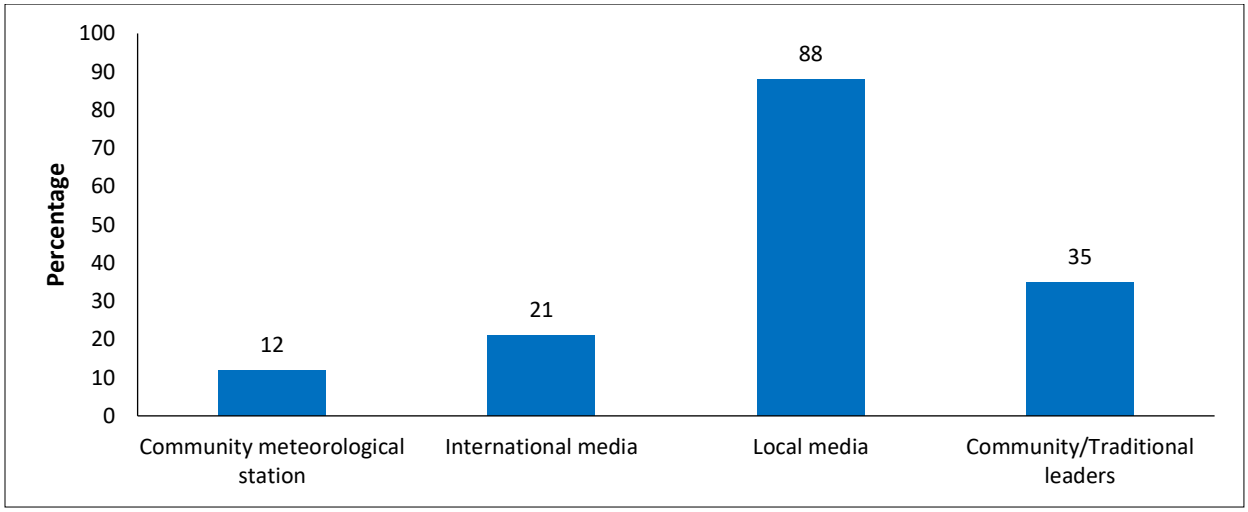

Figure 32: Types of community early warning systems

Community leaders play a key role as a source of early warning systems, as the study notes that 35% of households indicated that early warning information is conveyed by means of community or traditional leaders via several village headmen. A few interviewed households cited that community leaders constantly inform communal households of the community of new weather forecast development. Appropriate advice is conveyed on the appropriate time to plough their crop fields, obviously depending on the weather-related information received. International media, such as international TV programmes

on weather and climate-related information, are accessible to the community, as indicated by 21% of interviewed households. This is supported by the fact that households with electricity or solar connections and the ability to own a TV set are eligible to access weather and climate information. Only 12% of interviewed households cited that their source of early warning information is conveyed from the community meteorological station. It is worth noting that an early warning system that is integrated with the slow start of a drought can provide ample time for community decision-makers to apply and mitigate drought threats, such as preparing for emergency food suppliers, planning and employing water harvesting infrastructure, or employing new dry-land farming initiatives.

4.7.2 Reliability of early warning information systems

Early warning information systems are gradually being applied globally to lessen the potential risks posed by natural disasters such as drought. These systems ensure that information on potential future and ongoing natural disasters is conveyed timely, as this lessens loss of life and structural harm to the environment. Sättele, Bründl and Straub (2015) emphasised that early warning information systems are considered cheaper as they proactively discover potential dangers. They have progressed rapidly recently with all available technical development and technological advancement; hence, they are frequently applied as a mitigation measure in an integrated risk management approach.

Considering the reliability of an early warning information system that conveys weather and climatic-related forecasts to the community, the study investigated the reliability of this information system by means of responses from respondents. As displayed in Figure 33, the majority of respondents (43%) indicated that information systems are reliable as they are considered dependably good in terms of quality and have the ability to be trusted by the community with drought readiness, response, and recovery measures.

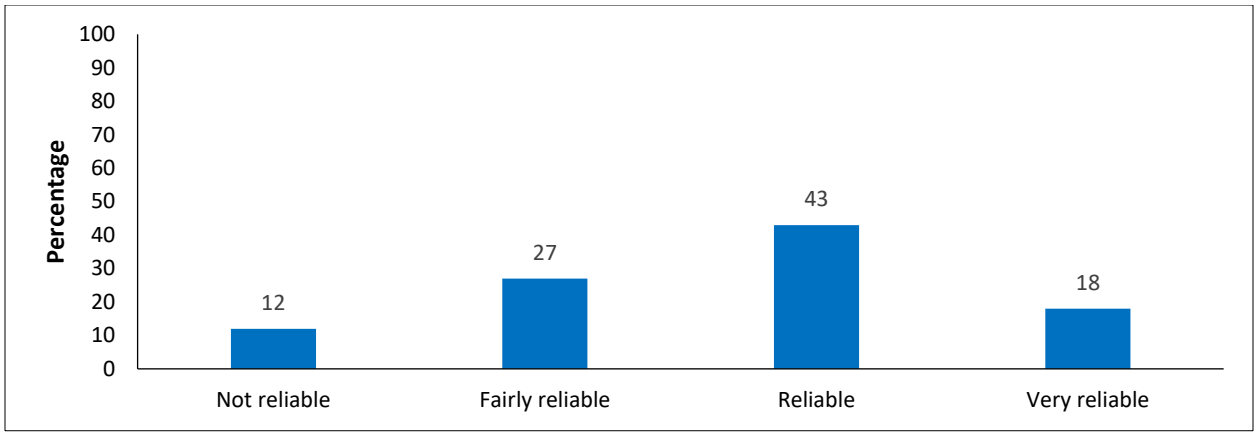

Figure 33: Reliability of early warning information systems

However, 27% of respondents rated the level of reliability of information systems as fairly reliable, and respondents specified that information systems are reliable to a certain degree but not very reliable. On that note, communal households trust and depend on the reliability of this information, but to a certain extent and not fully. Remarkably, 18% of households interviewed rated and considered early warning information systems to be very reliable in assisting with appropriate drought readiness and mitigation efforts. Only an insignificant fraction (12%) of households rated the reliability of information systems as untrustworthy. Overall, the study findings in Figure 33 demonstrate that the reliability of information systems in the community is fairly rated. The majority of respondents trust the alertness of drought-related information that emanates from these systems.

4.7.3 Readiness strategies for drought effects on livestock production

Study results in Figure 34 show that most readiness was performed based on the early warning information (39%) received by means of local radio and TV on an imminent drought that was provided to households.

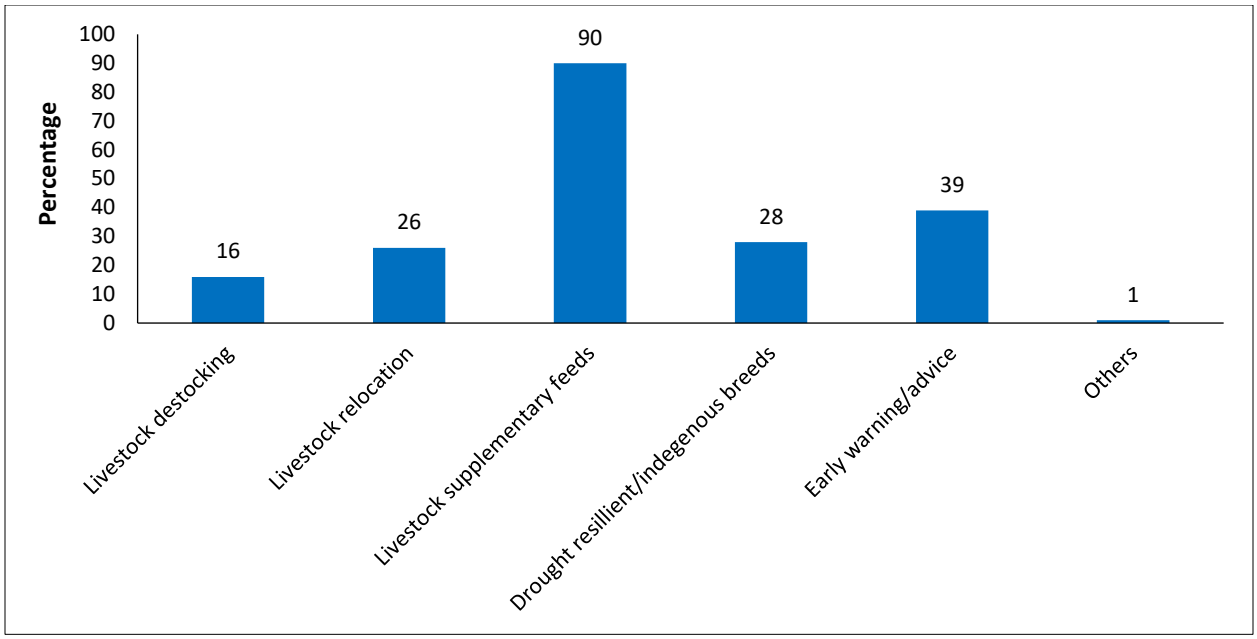

Figure 34: Measures employed as readiness to drought on livestock production

It is for that reason that at the early warning signs, communal households (90%) practicing livestock farming, especially those with a fair financial position, ensured that livestock supplementary feeds were available. Respondents procured several livestock feeds, mainly lucerne and hay bales, to supply food for livestock during the drought. Poor households revealed that they preserved crop remains from the previous growing season after the harvest. Furthermore, they rotated the grazing of livestock in existing camps situated in an 'Ekove' an area that is privately owned land, fenced off, and part of the customary land rights of a specific household. This area serves as a grazing unit during the dry or drought seasons. A marginal number of households (28%) opted to rear indigenous livestock breeds (Sanga cattle) that are well adapted to the most arid conditions of northern Namibia. This breed is more resilient and thrives well in harsh conditions. As per the results in Figure 34, livestock relocation (26%) and destocking (17%) were other substantive measures that households employed fairly with the key aim of minimising the impacts of the drought on livestock production.

As per tradition and for reservation purposes, most communal households own or have access (grazing rights) to communal grazing land in designated areas. This grazing land is mostly miles away from homesteads where they rear the majority of their livestock, and only minimal livestock is kept on customary land. Prior to the drought, households specified that they relocated most of their livestock to designated areas with better grazing with the aim of minimising the pressure on customary grazing land

as the land could not support a large volume of livestock and increasing their chances of survival. Mutually, households stated that all these readiness strategies employed yielded fair results in minimising the impacts of drought on livestock, but the severity of the drought was extremely intense. However, high, inevitable livestock mortalities were still experienced. This was reported by MAWF (2019) in the annual Agricultural Inputs and Household Food Security Situation report of 2019. Over 88,219 livestock mortalities were reported as a result of the country's severe drought from the beginning of October 2018 to the end of September 2019 (MAWF, 2019).

4.7.4 Readiness strategies for drought on crops and vegetable production

According to the UN (2017), drought readiness for crop production is mainly associated with collective approaches that involve the formulation of appropriate legislation that is linked to a set of contingency plans and fundamental actions. These actions are employed by institutions and crop-growing households prior to drought events, which will support households in shaping their livelihoods while at the same time enhancing institutional and administrative management capabilities to completely forecast and warn of imminent drought events. This will guarantee that coordinated and effective response approaches in drought events are employed.

Results in Figure 35 show that after communal farmers received early warning information and advice (39%) to adequately prepare for the possibility of a drought, which was forecasted by the Namibia Metrological Services. All weather-related information was conveyed to community members by means of several media platforms, including TVs, radios, mobile phones, and community meetings with traditional authorities and constituency councillors.

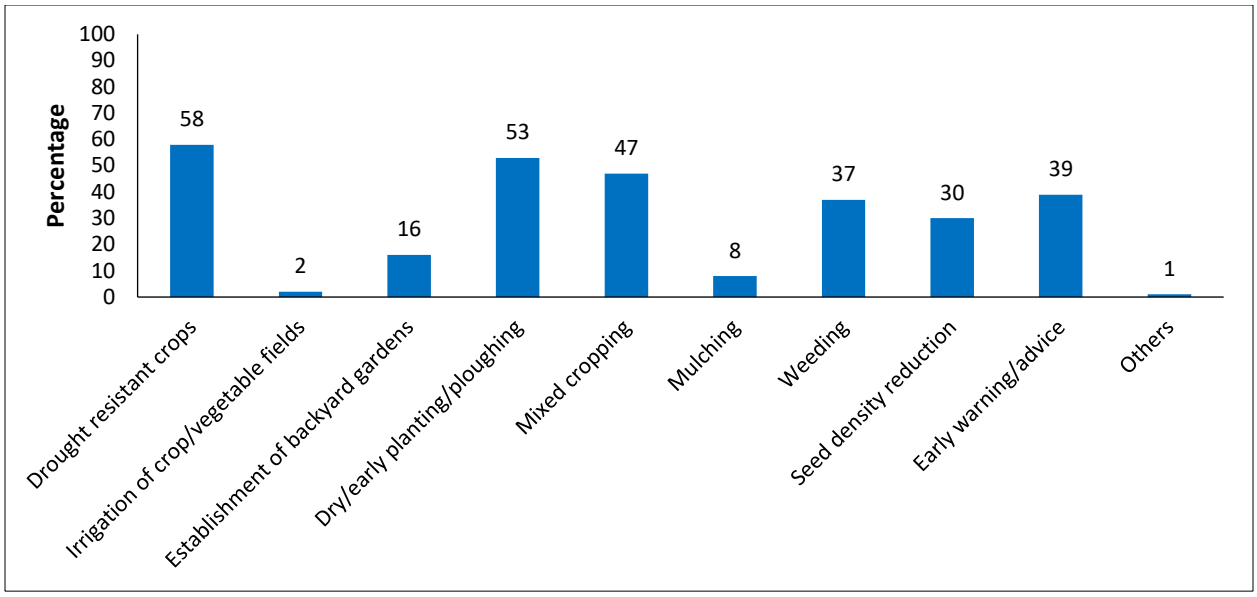

Figure 35: Measures employed as readiness to drought on crops and vegetable production

Study results, as illustrated by Figure 35, show that communal households have chosen the approach of considering and growing drought-resistant crops (58%) mainly pearl millet and sorghum, since they are common in northern communal areas. Drought-resistant crops are considered effective by communal households as they are improved seeds. These seeds are normally acquired from the Ministry of Agriculture, Water and Land Reform, rural development centres, and private retailers. Communal households stated that these drought-tolerant seeds thrive best in harsh conditions such as drought. These seeds have evolved over the past years with several mechanisms to have the ability to survive fairly well with water deficit stress, which was the main case in the 2018/19 agricultural drought era.

Households further specified that after receiving early warning and advice information, they opted to employ the dry and early planting approach (53%), as early as possible. This was performed to ensure that the available soil moisture is conserved at the early stages of the growing season, towards the reproductive periods. Another benefit is that it assists farmers in fighting weeds that compete for essential nutrients and water with the main crops. Interestingly, as a matter of diversifying crop production at the household level, households specified that they employed the mixed cropping approach (49%), which ensured that diverse yields were attained from the crop field, and this is regarded as a mechanism for maximising yield. Communal farmers expressed their concerns pertaining to growing a single crop, mainly pearl millet, the entire season, as in cases of crop failure when there was drought.

Several other measures employed by communal households in the readiness phase were noted by this study, such as the weeding of unwanted plants from crop fields (37%). Weeding is aimed at minimising competition for essential nutrients and the little soil moisture with key crops, therefore increasing the chances of a successful harvest. To reduce competition among crops, 30% of households specified that at the early stages of planting, the reduction of seedling density by means of thinning was an additional approach they employed. This was done with the aim of ensuring that competition among crops grown is significantly reduced, as there is minimal soil moisture and nutrients available. Notably, a commendable finding is that 16% of households established irrigable backyard gardens. This was implemented as per the agricultural advice established by the Agricultural Extension staff of the Ministry of Agriculture, Water and Land Reform instead of hoping for an annual harvest from rain-fed crops that was not certain.

4.8 Drought interventions

4.8.1 Interventions employed by households to cope during the drought period

In respect to drought response mechanisms employed at the household level, the revised Drought Risk Management and Mitigation Strategy by the UN (2022) focuses on strategic interventions with expected outputs. These outputs include the establishment of drought response approaches at the household level, instituting capacities and plans for assistance or intervention during the drought event, and ensuring that financial resources are mobilised accordingly and assistance is rolled out to the most affected communities. This further comprises the coordination of water shortage contingency plans to address water shortages that are experienced by vulnerable communities and the environment. All the said strategic interventions are expected to enhance household assistance and enhanced response capability to meet the needs of severely affected households and communities. This will enhance the availability of water resources during drought events. Overall, drought contingency planning has improved at the national and sub-national levels.

Household surviving strategies for the drought were analysed to provide an overview of response interventions that were employed by communal households. Results in Figure 36 show that the majority of households (78%) primarily relied on existing food reserves in traditional and modern storage facilities with harvests from past years as a means of food supply during the drought.

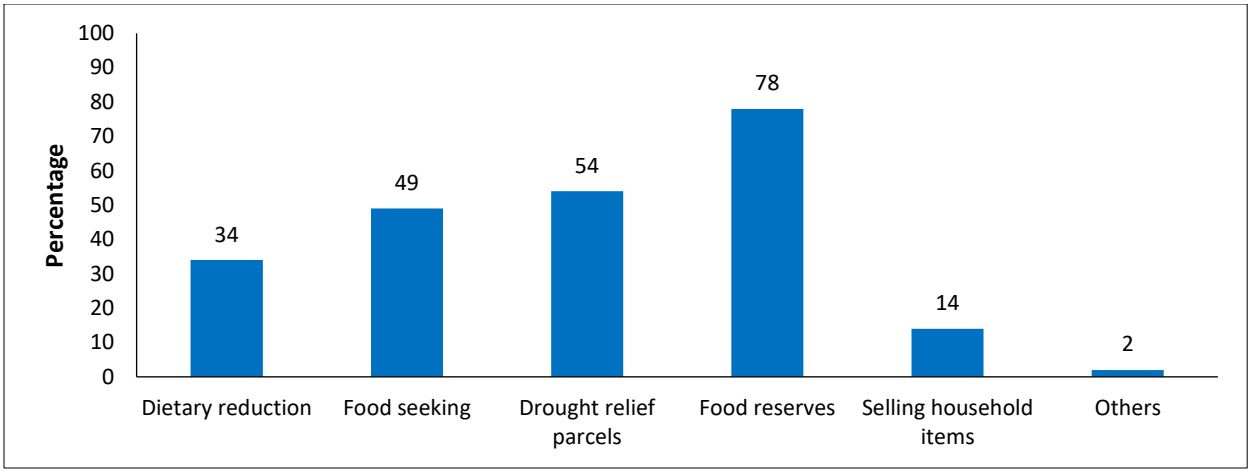

Figure 36: Drought coping strategies employed by households

This resembles and is strongly supported by the results of this study on crops and vegetables grown by communal households, whereby the results clearly show that pearl millet is the dominant crop grown mainly for household consumption, while less is marketed in formal (MAWLR's Regional Office–Rural Development Centre) and informal markets (open-market and public). Since households experienced a fair harvest the past few years prior to the 2018/19 agricultural drought, existing food reserves at the household level have the ability to cater for household food needs for a few more years without any harvest.

Another response mechanism specified by households is that they received drought relief parcels (54%) from the GRN as emergency assistance and a way of ensuring that basic household food dietary needs are available, especially for the most vulnerable households in the community. The African Development Bank (ADB) rendered humanitarian assistance as a matter of urgency to Namibia at an estimated amount of one million United States dollars (US$ 1,000,000) (African Development Bank, 2019). A significant amount of funding, to the tune of N$573 million, from the fund offered by the African Development Bank was recorded as expenditure in support of communal farmers with food assistance for households, procurement of water tanks in communities, provision of marketing incentives for livestock, transport subsidy within grazing areas, and provision of livestock fodder (Tjitemisa, 2019). Furthermore, the Emergency Relief Assistance Operation was entirely financed from the Bank's Special Relief Fund and fully administered and implemented by the Ministry of Agriculture, Water and Land Reform in parallel with the Directorate of Disaster Risk Management within the Office of the Prime Minister.

The African Development Bank (2019) clearly specified that the ultimate aim of the Bank Group Emergency Relief Assistance to Namibia was mainly to complement existing efforts by GRN and other humanitarian associates to lessen the impact of the drought. It is for that reason that relief assistance from ADB enabled GRN to work on the immediate needs of vulnerable households in communities that were hardly hit. The emergency assistance in the form of a drought relief parcel was late and associated with corruption in terms of the selection of vulnerable households on who should receive this assistance as per the expressions of the respondents to this study. Destitute households were left with no other option but were forced to resort to the food-seeking approach (49%). Food seeking enabled them to meet household food needs. Households further cited that drought relief food parcels were extremely late in being received by the community, mainly caused by poor coordination in logistical arrangements, delays, and challenges. Dietary reduction was an additional response strategy employed by 34% of households. Thus, strategy was aimed at lessening the quantity of meals prepared per day to reserve food for the next day while considering the household size.

The sustainability of these strategies employed by communal households was further analysed to determine their long-term applicability and sustainability. It is commendable that the majority of communal households primarily relied on food reserves from grain harvests from past years as a mechanism of ensuring that food supply is readily available in the event of a drought. This is a much more sustainable approach from communal farmers compared to humanitarian interventions such as drought relief, which create a dependency syndrome among smallholder farmers. The International Water Management Institute (2021) expresses concerns that Africa mostly focuses on drought management and humanitarian aid interventions during and after drought events rather than investing in long-term strategies. These strategies are resilient and employable at the household and community level prior to drought events.

Despite that, Shalaby (2021) urged that African governments in particular and the international community should significantly boost investments that are linked to long-term plans. Long-term plan investments are geared towards building resilience and increasing the agricultural productivity of smallholder farmers in many parts of Africa. Shalaby (2021) further laid emphasis on the fact that these measures must concentrate on the following aspects: (1) reduction of disaster risk; adoption of strategies pertaining to development and humanitarian aid to minimise risks that may arise with future droughts. The cycle of drought management offers an effective strategy that needs to be effectively and consistently

employed by several governments. (2) Adaptation to climate change is required, as this will eventually build the coping capacity of the most vulnerable households and ensure that they adapt better in spite of changes to the climate affecting their livelihoods. (3) Access to reliable information on the changing climatic conditions will be of significant importance to communal farmers at the household level. In a nutshell, long-term investment, particularly with attention to protecting smallholder farmers, will eventually increase food production. In the long term, it will gradually contribute to the socio-economic and sustainable development of the community. It will have the potential to assist smallholder farmers in employing effective measures that will help them cope better with the drought.

4.8.2 Strategies employed by households on soil and water management during the drought

Cornelis (2019) briefly highlighted that soil and water management at the household level entails several practices. These practices help improve the distribution of rainwater and therefore, the soil-water balance. This includes the integration of scientific knowledge and expertise (environmental scientists) and Agricultural Extension staff with communities at the grass-roots level that are well acquainted with vast local knowledge and experiences by farmers. Cornelis (2019) further stated that practices of soil and water management range from improving the physical quality of the soil by increasing rainwater infiltration capacity by using soil amendments to the implementation and adoption of conservation agricultural practices, the application of mulches, cover crops, and crop residues, and water harvesting practices.

It is obvious that soil and water management play a fundamental role in the existence of droughts in a particular area, as they directly impact the distribution of rainwater. This ultimately impacts the amount of water that is available for plant growth (Cornelis, 2019). Moreover, Cornelis (2019) emphasised that soil quality is directly linked to the extent and intensity of hydrological droughts (instigated by a shortage of water). This determines the recharge rates of groundwater found in aquifers. It is for that reason that the slowly moving groundwater preserves continuous streamflow. It consequently guarantees the steadiness of surface water resources mainly by means of base flow, in contrast with storm water that flows rapidly resulting from peak discharge, and this sort of flowing turns out to be run-off water. Furthermore, soil quality plays a role in rates of meteorological drought by means of precipitation feedback (Cornelis, 2019). Reductions in evapotranspiration originating from variations in rainwater distribution, as stated above, have a direct and indirect role in lessening rainfall prospects locally and over long distances.

Communal households were accorded the opportunity to select suitable soil and water management strategies that their households employed and adopted during the drought. Findings in Figure 37 show that since there was minimal water available in the community, minimal rainfall was received. More emphasis by households was laid on conservation of present water resources (69%) at the time of the drought. Households emphasised that the idea was to safeguard the available water resources by effectively employing appropriate water management strategies.

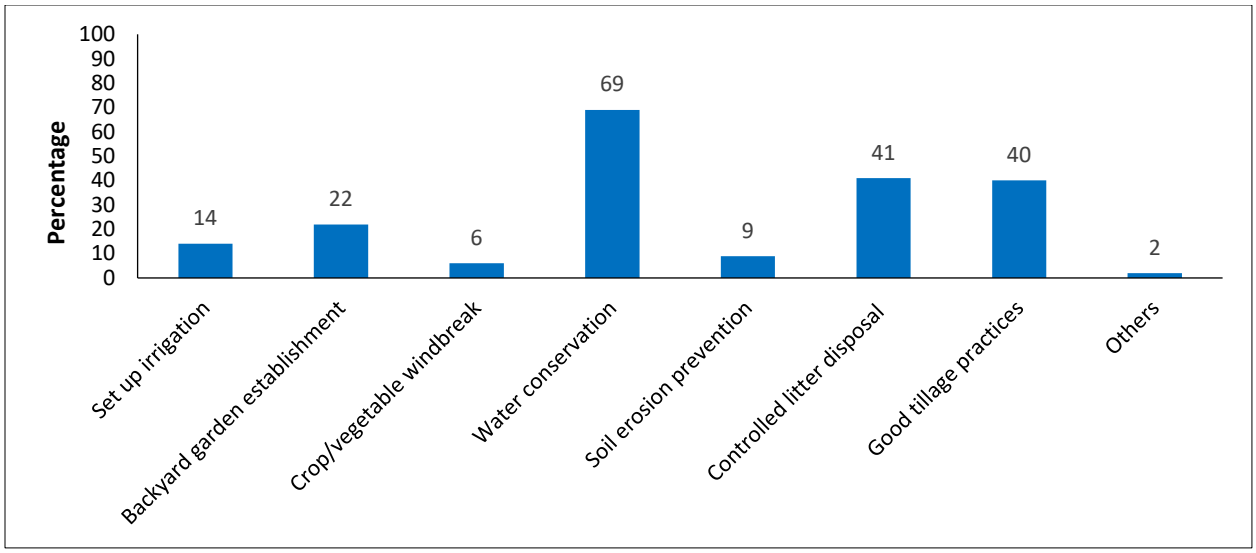

Figure 37: Soil and water management strategies employed by households during the drought

Good tillage practices that include conservation agriculture were employed by households at the early stages of the ploughing season. Households were trained on the implementation of conservation agriculture, and they specified that conservation agriculture is ideal. Conservation agriculture is associated with prolonged minimum mechanical soil disturbances, the availability of permanent organic soil cover in the soil, and the diversification of crop species grown in sequence, which provides and plays several beneficial roles. Households further specified that, apart from improving soil quality in various ways, crop residues lessen the speed of flowing run-off, hence improving water penetration, minimising soil evaporation rate, and lessening extreme transpiration as they control weeds. Controlled litter disposal is another approach that is employed by 41% of households. They indicated that an appropriate waste management system at the household level is encouraged, with the aim of ensuring that the environment is free from litter, especially non-degradable waste. This kind of waste has the ability to harm the environment in the long run.

Interestingly, 22% of interviewed households specified that the establishment of backyard gardens is essential and helps conserve water and moisture in the soil. Gardening played a role in soil management in such a manner that garden establishments assisted in maintaining and striking an ecological balance by fostering biodiversity in the ecosystem (Figure 37). The setting up of irrigation systems (14%) was documented as low. This is supported by the fact that households that employ this approach are those that are engaged in horticultural production have better financial means for procuring irrigation equipment. They are close to year-round water sources such as the Calueque-Oshakati canal. Nevertheless, the majority of households, especially those that are engaged in cultivating rain-fed crops, felt that it was inappropriate to irrigate rain-fed crops.

4.8.3 Strategies employed by households for livestock management during the drought

Livestock farming in Namibia is mainly classified into a commercial setup that has plus or minus 4,500 commercial farmers in possession of a title deed of their privately owned land and a communal setup that has plus or minus 120,000 communal farmers on a customary land right that belongs to the state (Lendelvo, Kemanya, Gabriel & Huhn, 2020). Furthermore, communal land has the ability to support about 64 percent of the total cattle population, 72 percent of goats, and 17 percent of sheep. Farming for livestock in communal areas is mainly practiced at a subsistence level and is highly susceptible to variations in climatic conditions and emerging internal and external shocks (Lendelvo et al., 2020). Droughts normally reduce the number of livestock in communal areas significantly, mainly prompted by overstocking and rangeland degradation. It is therefore important that communal households sustainably manage their livestock during drought events with the aim of lessening high livestock mortalities (Lendelvo et al., 2020).

The results displayed in Figure 38 show that the leading strategy employed by communal households during the drought was access to supplement fodder for livestock (82%). A number of households accessed supplement fodder by means of private procurement and existing livestock feed reserves of crop remains from previous harvests. Other farmers received emergency assistance from GRN. This finding resonates with the financial figures of the African Development Bank (2019), whereby the safeguarding of livestock and minimising high livestock mortalities were key commitments from GRN. The government emphasised its commitment to protect all Namibians and their livestock from drought.

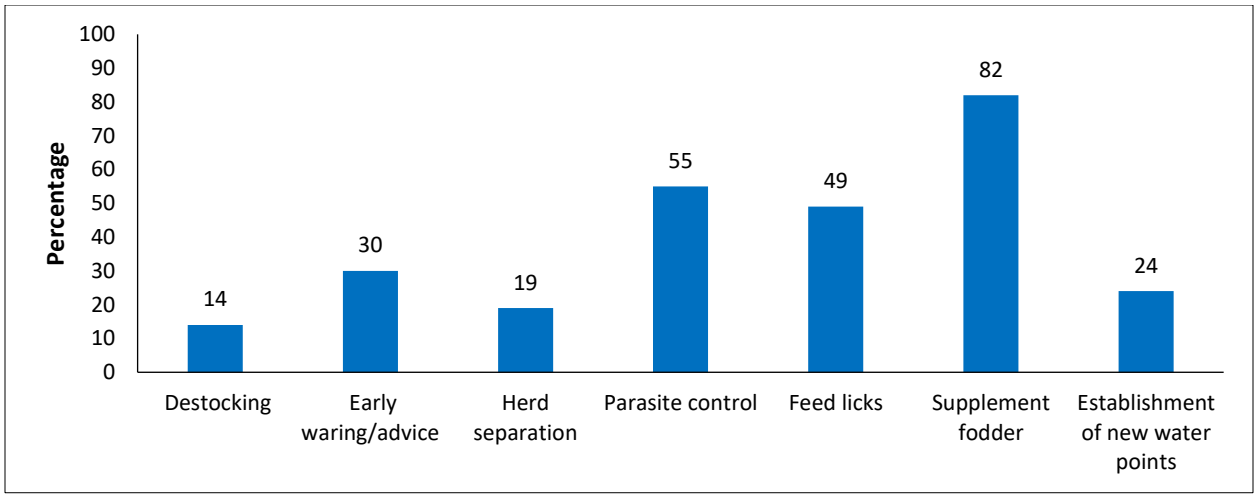

Figure 38: Strategies employed by households on livestock management during drought

Financial figures by the African Development Bank (2019) further show that USD 1,000,000 was received as humanitarian assistance. An amount of USD 380,000 was earmarked for livestock supplementary feeds, of which USD 230,000 was allocated to procure lick supplements for livestock (core herd), while USD 150,000 was reserved to procure livestock feed (fodder subsidy). Communal farmers expressed their gratitude for the GRN's commitment to facilitating such humanitarian assistance. This assistance from ADB ensured that communal farmers procured the necessary livestock feeds at a subsidised price from local suppliers.

It is very common that as livestock body conditions depreciate and overall health declines during drought events, livestock become more susceptible to contracting diseases and pests as their immune systems are compromised. Therefore, 55% of households indicated that parasite control was another key activity employed by communal farmers (Figure 38). Drought made internal parasite infections among livestock more severe, and livestock were already stressed as there was minimal grazing and the quality of forage available was very low; hence, parasite infections were exacerbated by these conditions. Communal farmers cited that the reduction in nutritional quality led to a weakened immune system. This minimised the level of natural protection that livestock have as a means of defence from internal and external parasites. The procurement of lick supplements for livestock by GRN was part and parcel of GRN efforts, and USD 230,000 was reserved for such an acquisition. This was employed in safeguarding the survival of livestock and is in line with the findings of this study that a significant number of households (49%) employed the approach of procuring subsidised feed licks (Figure 38).

Since there was a shortage of water in communities and the majority of livestock depended on natural water sources for drinking, 24% of households implemented the approach of establishing new water points. This process involves the digging of new water ponds, while their efforts are complemented by GRN initiatives that focus on the drilling of new boreholes, rehabilitation of existing boreholes and earth dams, and delivery of water tankers in several communities. Strategies such as herd separation (19%) and destocking (14%), which were not fully embraced and employed mainly by households. Households cited that since grazing conditions were poor everywhere, separating livestock was not a solution, and those who were willing to implement it were met with drawbacks that involved transportation costs. While on the destocking strategy, 14% of households indicated that they were able to destock. The majority were unable to destock by means of selling some livestock as there was no market available since local farmers and fellow households were not willing to add to the existing burden of livestock management.

4.9 Post-drought recovery strategies

Results in Figure 39 show that the most dominant post-drought recovery strategy implemented by 72% of communal households is the re-building of their livestock herds. Households indicated that they suffered high livestock mortalities.

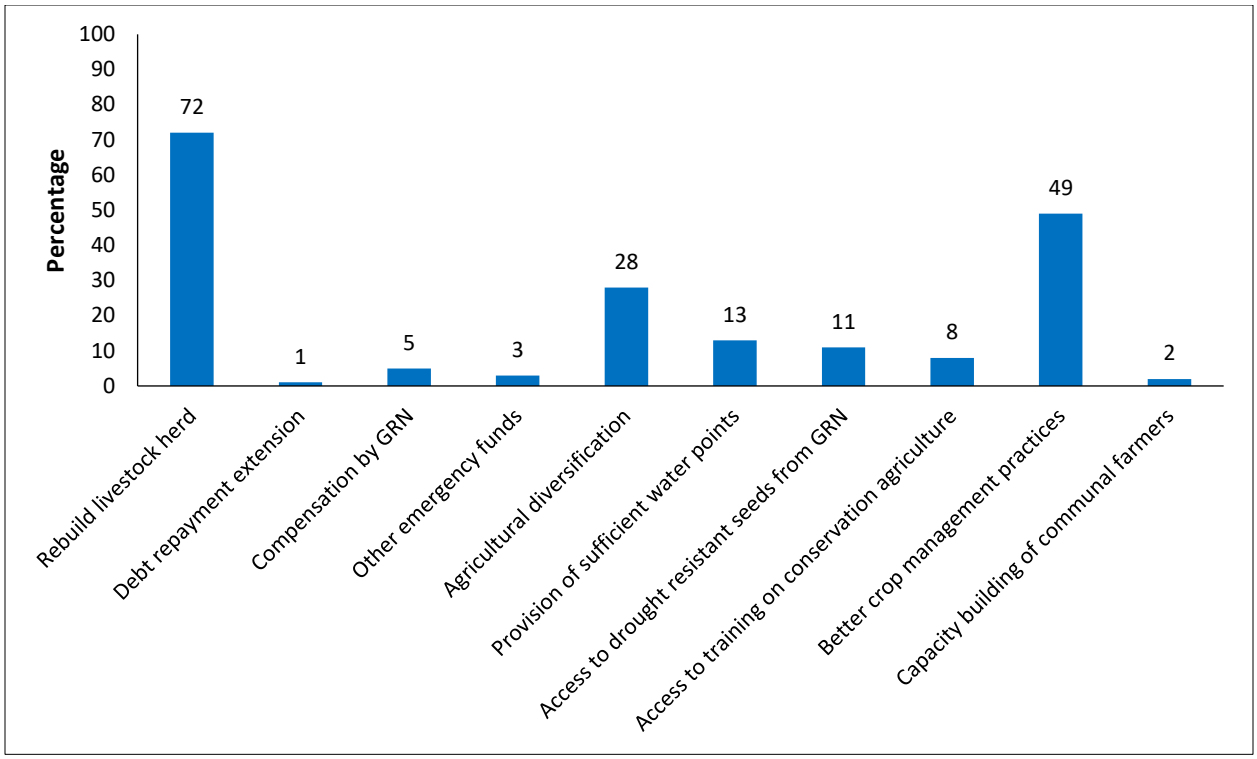

Figure 39: Strategies employed by households for post-drought

This correlates with the findings in the Agricultural Inputs and Household Food Security report by MAWF (2019) that 88,219 livestock mortalities were experienced nationally from the beginning of October 2018 towards the end of September 2019. More than 56% of livestock mortalities reported were cattle; goats account for 31%; sheep stand at 12.3%; and donkeys and horses all recorded less than 1% at piece (MAWF, 2019).

According to Matthys (2021), the drought that resulted in building livestock herds continued in 2021. More than 1,362,364 million cattle were marketed (both in the communal and commercial sectors) during the period of 2017-2019, associated with a decline of more than half that was recorded in 2020. Matthys (2021) further mentioned that with the continued herd-rebuilding by Namibian farmers, an additional decline in livestock marketing, especially cattle, was highly projected in 2021. The Meat Board of Namibia forecasted a formal slaughtering at local abattoirs of less than 53,000 cattle for the year. As of February 2021, a total of 7,775 cattle were slaughtered in the formal market.

Since communal households are mainly practicing livestock and crop farming at a subsistence level, all leading post-recovery arrangements were mainly focused on the recovery and advancement of

subsistence farming. Globally, there are widely recognised sustainable management practices for agricultural crops geared towards maximising yield results (Adom, 2019). Adom (2019) further emphasised that communal households should therefore pay attention to key issues in relation to agricultural crop management aspects. These practices should intensify crop production, improve soil quality, and ensure biodiversity and management while at the same time reducing general environmental costs. It is, however, noted that the severe effects experienced during the drought led to communal households engaging in better crop management practices (49%) for the future. Respondents signalled that they employ crop rotation and intercropping, agroforestry with assistance from community tree planting projects, sustainable water and irrigation management systems (horticultural producers), inorganic fertiliser, mainly animal manure sourced from kraals, and practice good tillage practices.

Most importantly and interestingly, a recovery measure employed by communal households is agricultural diversification. Results show that 28% of households specified that they are engaged in diversifying agricultural farming activities. This was done to ensure that several systems of agricultural production are functional, with the key aim of not relying on a single agricultural production system (Figure 39). Households specified that they are engaged in poultry, piggery, and horticultural gardening. Respondents further indicated that they would like to ensure that agricultural productivity is increased from all angles while not relying on a single farming system. This is done in the sense that if a single system fails, another system is sustainable. This way, households are able to ensure food security while generating and increasing additional income that will sustain their daily operations.

As illustrated in Figure 39, the study notes other drought recovery measures that are not commonly implemented by households, such as the provision of new water points (13%); drought resistance seeds from GRN (11%); access to conservation agriculture training (8%); compensation by GRN (5%); access to other emergency funds (3%); capacity building of communal farmers (2%); and debt repayment extension from financial institutions (1%).

4.10 Thematic analysis

Maguire and Delahun (2017) define thematic analysis as a qualitative research approach that researchers normally employ to organise and analyse data sets in a more systematic manner. Maguire and Delahun (2017) added that themes are identified by means of explicit reading, and a comprehensive thematic

analysis has the ability to generate reliable findings. Below is a qualitative thematic analysis of the 2018/19 agricultural drought. This analysis was performed to provide an in-depth understanding of the impacts of the 2018/19 agricultural droughts on the community and the interrelationships that exist among variables. The thematic analysis started with the impacts of the 2018/19 agricultural drought and drought management strategies as the main study themes. Respondents indicated that drought impacts range from livestock losses to loss of household income, weakened livelihoods, and water scarcity. To avert and minimise the impacts associated with the drought, communal farmers employed several strategies as readiness, response, and recovery measures, which all form part of the sub-themes of the study.

4.10.1 Patterns of drought readiness (crops, vegetables, and livestock)

Concerning the drought readiness strategies employed by communal farmers, farmers indicated that they implemented strategies in relation to early warning information systems. This served as a guiding tool to select the appropriate measures for readiness for crop and vegetable production as well as livestock production. The sources of early warning information systems present in the community as per the responses of the farmers are community leaders, community meteorological service stations, international media, as well as the local media. Common options available to farmers in relation to the source of early warning information are radios, cell phones, and televisions. These options are largely influenced by the dominant age category among the interviewed farmers. Elderly members of the community prefer local media that is readily available in the vernacular language, which they understand better. Communal farmers indicated that the information received is reliable as it assists with better decision-making.

Communal farmers' employed several readiness strategies for crop production. These strategies range from planting drought-resistant crops, reliance on early warning advice from early warning information systems, irrigation of crops and vegetables, establishment of backyard gardens, dry or early planting, mixed cropping, mulching, weeding, and seed density reduction. The study, however, notes that the dominant readiness strategy for crops is the establishment of backyard gardens. This is an evolving initiative practiced by communal farmers in northern Namibia. The establishment of backyard gardening is a common initiative that is gaining momentum among smallholder farmers with the support of several institutions. The support is rendered by means of technical and financial support by the Ministry of Agriculture, Water and Land Reform. The Ministry has various programmes and projects that are geared towards addressing food security at the household level, especially among poor rural households. There

are other institutions and organisations that render support of all kinds, such as WFP, the Food and Agriculture Organisation, Agribank, and other non-governmental organisations.

The support accorded by these institutions is both financial and technical. Establishment of backyard gardens is beneficial in several ways: (1) household food security is realised; (2) nutritious food is readily available; and (3) employment is created for the unemployed youth. Ultimately, the livelihoods of communal farmers have significantly improved. Some farmers are not implementing the initiative of establishing backyard gardens despite the strong wish because of financial constraints, but most indicated that water scarcity is the limiting factor. Old age and a lack of skills in horticultural production were other contributing factors to the non-implementation of this initiative by some communal farmers. There is a need to scale up the support accorded by several institutions.

Communal farmers' employed several readiness strategies for livestock production. These strategies include destocking, livestock relocation, supplementary feeds, farming with drought-resistant or indigenous breeds, and the application of early warning advice provided by early warning information systems. The majority of communal farmers opted to supply their livestock with supplementary feeds that are readily available and nutritious to support the well-being of animals. The majority of communal farmers were able to afford the procurement of livestock feed because of the subsidised fodder provided by the GRN through the Ministry of Agriculture, Water and Land Reform. Financial constraints restricted some farmers from procuring sufficient feed, especially communal farmers who do not have full-time employment but have only a single main stream of income, which is either farming or those relying on government pension funds. The GRN pension fund is already not sufficient to cater for immediate household needs. Therefore, the addition of expenses such as the procurement of fodder will result in a burden on household financial wellbeing.

4.10.2 Patterns of drought intervention (household level, soil and water management, and livestock management)

Communal farmers responded to the drought at the household level through soil and water management and livestock management. To mitigate the impact of the drought at the household level, farmers employed several strategies, ranging from dietary reduction, food seeking, reliance on drought relief parcels, and food reserves. Most communal farmers relied on past-year food reserves to ensure that adequate food was readily available, as this addressed food security, hunger, and malnutrition at the

household level. Communal households relied on existing food reserves because the 2017/18 growing season was not associated with drought. Therefore, food reserves were still reasonably at their optimal level. Another reason is that since most of the households are headed by pensioners and unemployed heads who literally do not have sufficient funding, they prefer resorting to existing food reserves, an approach that they have been employing for decades and that has been sustainable. Reliance on drought relief food parcels emerged as a common intervention from communal farmers. This is evident since humanitarian aid and assistance were rolled out to the most affected communities. Even if this is a reactive approach, GRN was left with no other feasible options to address the immediate food needs of households. The key aim was to ensure that the lives of all Namibians were preserved, and the President emphasised that there should be zero deaths linked to hunger and starvation. This study suggested that the administration approach to the management of droughts must shift from employing reactive approaches to proactive approaches.

Conservation of the soil and water is a key and fundamental issue in conserving the environment. Data patterns and information on the conservation of the soil and water management show that several mechanisms show that most communal farmers employed the water conservation measure because of the water shortage in the community. This calls for an urgent need to address the issue of access to water in communal areas. The GRN is highly committed to addressing water security. The Ministry of Agriculture, Water and Land Reform has a water programme. This programme is aimed at ensuring water supply security through sustainable management of readily available water resources in a coordinated manner. Furthermore, it ensures that there is a coordinated planning approach for rural and bulk water supply systems and infrastructure. The management of water infrastructure and effective monitoring systems are important components of an integrated water management system.

Concerning response to livestock production, the pattern shows that communal farmers supplemented livestock feeding with supplement fodder as a way of ensuring that the required nutrients of the livestock were maintained. Farmers were left with no other options but to go for this reactive approach. Most farmers were able to procure livestock supplementary feed since the cost of fodder at local retailers was subsidised by the GRN with funds from the humanitarian support provided by the African Development Bank. As part of livestock feed, feed licks form part and parcel of the most popular items opted for by communal farmers during the drought event. The idea of ensuring that fodder is available is because, in his statement of declaring the drought, the lives of livestock of Namibian farmers should be preserved at

all times. Preserving the lives of livestock is an important aspect since communal farmers' livelihoods largely depend on communal farming. The loss of livestock is directly linked to a loss of livelihood.

4.10.3 Patterns on drought recovery

On the recovery aspect, communal farmers concentrated more on the rebuilding of livestock herds since they had lost significant livestock during the drought. Farmers felt the need to rebuild herds since their livelihoods largely depend on subsistence farming. Better crop management emerged as another option employed by most communal farmers. Farmers are of the opinion that they would like to employ better crop management practices to avert future losses. A number of households strongly specified that they are diversifying farming by engaging in poultry, piggery, and horticultural gardening. Respondents further indicated that they would like to ensure that agricultural productivity is increased in all ways while not relying on a single farming system. This is done in the sense that if a single system fails, another system is self-sustaining and sustainable in the long run. This way, households will be able to ensure food security while generating and increasing additional income that will sustain their daily operations.

4.11 Chapter summary

The primary aim of this chapter was to present and interpret results that emanated from the assessment of drought readiness, interventions, and post-recovery measures employed by communal farmers in Outapi constituency. This chapter presented readiness, interventions, and recovery mechanisms that were implemented prior, during, and after the drought, respectively. The factors that influenced and prompted the selection of such mechanisms were presented. As per the findings of the study, the most common relative age group of household heads is above 60 years. However, gender distribution is equal for both males and females, with the majority being married with legal certificates. Study findings show that the main source of household income is the pension fund and other social grants. Farming in communal areas is dominated mainly by crop production and livestock rearing. Severe impacts suffered by the drought were lack of water, high crop production losses, high livestock mortalities, weakened food security, and deteriorated livelihoods; hence, communal farmers prepared, responded, and recuperated differently. In terms of readiness, response, and recovery measures, the study notes that the employment of sustainable and proactive measures is key. These measures ensure that communal households cope with drought events in a more sustainable way, as this is key to reinforcing and building resilience at the household level. This will allow communal households to better cope with future droughts. Lastly, a

thematic analysis was performed to identify, analyse, and interpret patterns of meaning within the data in relation to drought readiness, response, and recovery efforts. The study findings led to the conclusions and formulated recommendations presented in the next chapter.

Chapter 5: Conclusion and Recommendations

5.1 Introduction

Despite the minimal contribution to the country's GDP, the whole agricultural sector remains a key source of livelihoods for communal farmers. About 70 percent of the agricultural population resides in communal areas and mainly relies on subsistence farming as a source of livelihood. The study area of Eengolo settlement in Outapi Constituency, Omusati Region, was negatively affected by the 2018/19 agricultural drought event, whereby high livestock mortalities and crop production losses were experienced. It is for this reason that this study was implemented with the aim of assessing the drought readiness and recovery efforts of communal farmers during the 2018/19 agricultural drought. The study analyses drought readiness strategies, drought interventions, and post-drought recovery strategies employed by communal households.

Data were collected by means of household surveys with communal farmers and key informant interviews with institutions that play a key role in drought management. Supplementary analysis, which includes cross-tabulation and thematic analysis, was performed with the aim of explaining the relationship and pattern that exist amongst the data. This particular chapter derives sound conclusions informed by empirical evidence and suggests sound recommendations. It is believed that the recommendations of this study will assist in contributing towards a more efficient, proactive, responsive, and accountable drought approach within the communal sector of Namibia.

5.2 Main conclusions by study objectives

This specific study assessed the choice of drought readiness strategies, drought intervention strategies, and post-drought recovery strategies employed by communal households. The results of the study clearly show that communal households experienced negative drought impacts and employed necessary mechanisms to prepare for the drought, interventions to cope with the drought, and post-drought recovery measures. Drought is known as a natural and climatic event that is inevitable, but measures can be employed as a way of better preparing communal households to cope with drought. This helps in creating an ecosystem that is more resilient, has a rigid ability to recover from drought, and lessens the

impacts of droughts. It is for that reason that details supporting this are discussed below as per the objectives.

Objective 1: To assess the level of readiness by communal farmers prior to the 2018/19 agricultural drought

Communal households employed several readiness strategies that they deemed fit for coping with drought. Readiness strategies were implemented to appropriately prepare and strengthen the ability of households to safeguard livestock, crops, and vegetables from losses. Since the majority of households specified that early warning information systems are very reliable in assisting with employing appropriate drought readiness plans, households further specified that all drought readiness measures were selected based on early warning information conveyed by all systems. The majority of communal households engaged in livestock farming acquired several livestock supplementary feeds, mainly lucerne and hay bales, and prices were still reasonable with the aim of stocking up supplies. Other farmers conserved crop remains from the previous harvest and reserve grazing camps to supply food for livestock in the event of the drought. A marginal number of households opted to rear indigenous livestock breeds that are well adapted in northern Namibia, are more resilient, and thrive well in harsh conditions. As soon as early warning information on the imminent drought was communicated, some households implemented the destocking approach on their livestock herd. Other farmers relocated a number of their livestock to areas with better grazing pasture. Households further specified that after receiving early warning and advice, they immediately implemented the dry and early planting approach, as this ensured that the available soil moisture was preserved. The majority of households opted for drought-resistant crops, mainly pearl millet and sorghum, which are common in northern communal areas. Households specified that these crops are generally effective as their adaptability is improved regularly and they strive better in harsh situations.

Objective 2: To analyse drought interventions employed by communal farmers and other stakeholders (government, development partners, and the private sector)

Several households' implemented different measures at household capacity with aid from GRN and donors, all geared towards lessening the impacts during the drought. Results show that it is a common response measure among households. The majority of households primarily depended on existing food reserves that constantly supplied the household with adequate food, especially pearl millet grains during the drought. The study notes another reactive response mechanism employed. More than half of the households received drought relief parcels from the GRN as emergency assistance, and this ensured that

basic household food dietary needs were available, especially for the most vulnerable households in the community. Nevertheless, this approach has been criticised by Wilhite (2011), who stressed that many response measures instituted by governments, international organisations, and donors in Sub-Saharan Africa basically amplified household vulnerability by increasing dependency syndrome and creating permanent reliance on internal (central government) or external humanitarian assistance (donors). A literature review such as that by Hassan (2013) suggested that drought policies in drought-prone countries such as those in Sub-Saharan Africa must shift from employing reactive drought approaches to proactive drought response approaches that promote self-reliance in dealing with current and future drought at the household level. Study results show that the availability of water was very minimal and scarce in the community as minimal rainfall was received; therefore, more emphasis by communal households was laid on conserving present water resources by employing appropriate water management and conservative strategies. To lessen livestock mortalities during the drought, most communal households procured subsidised supplement fodder from local suppliers. Other households employed minimal measures such as parasite control as most livestock body conditions deteriorated and became prone to diseases and parasite attacks; the establishment of new water points as most of them dried up; herd separation to lessen grazing pressure from the rangeland, but transportation was a challenge; and destocking livestock herds, of which households cited that this particular measure was not effective as the market was overwhelmed with livestock.

Objective 3: To analyse post-drought recovery strategies employed by communal farmers and other stakeholders (government, development partners, and private sector)

Most communal households, especially the destitute that primarily rely on subsistence farming as their main source of income, were faced with challenges. The challenges were associated with the implementation of post-drought recovery measures as they attempted to recover from the devastating effects of the drought. Despite the several challenges, communal households employed post-recovery measures that were within their means. Since most communal farmers were engaged in livestock farming at a subsistence level, the results of this study and supplementary literature reviews all testified that households experienced high livestock mortalities as a result of this drought. It is for that reason that the majority of communal households employ the re-building of their livestock herds as a recovery strategy by means of restocking. Almost half of the households are practicing crop production, and those that experienced high yield setbacks eluded to employing better crop management strategies for the future that will ensure that future crop production losses are lessened. Most importantly, some households

employed agricultural diversification as a recovery strategy for the present and future to ensure that diverse agricultural farming activities are practiced, while not relying on a single agricultural activity. Farming activities are specified as follows: poultry, piggery, and horticultural gardening. Recovery strategies employed by communal households were basically implemented within the socio-economic capacity of communal households. There is a need for supplementary actions and efforts from stakeholders that directly or indirectly deal with the administration of disaster management at all levels. This will build resilience and strengthen future disaster risk management capabilities and adaptability at the household level.

5.3 Recommendations

Having presented and deliberated on the key issues related to the drought readiness, response, and recovery efforts of communal farmers at Eengolo settlement, Outapi Constituency in Omusati region, with implications, the researcher concluded that it is worthy to formulate recommendations to communal farmers and key stakeholders. These recommendations focus on policy strategy and supplementary sustainable strategies that are aimed at addressing identified implications. After analysing and presenting the research findings, a number of recommendations were formulated that will assist communal farmers in Eengolo settlement and allied stakeholders in strengthening household drought coping capacity, institutional response, recovery, and building resilience.

5.3.1 Market access to crops, vegetables, and livestock for communal farmers

This study recommends that the Ministry of Agriculture, Water and Land Reform, Namibia Agronomic Board, and the Ministry of Industrialization and Trade, supplemented by efforts from the Constituency Councillor, should explore and create new market access and reinforce existing markets since most communal households mainly produce for household consumption. A review of existing policies that control the importation of fresh agricultural products into Namibia is required to ensure that smallholder crop farmers gain adequate local market access and uptake. The Ministry of Agriculture, Water and Land Reform and associates should continuously advise livestock farmers to destock since flexible herd composition permits emergency sales of livestock. All communal farmers should be given information on formal market access through community engagement meetings, agricultural workshops, and seminars.

5.3.2 Strengthen institutional coordination on disaster risk management

This study recommends that existing structural support systems of institutions responsible for the administration and implementation of emergency relief assistance, such as the Office of the Prime Minister, the National Disaster Risk Management Committee, the Namibia Vulnerability Assessment Committee, the Regional Disaster Risk Management Committee, the Local Authorities Disaster Risk Management Committee, the Constituency Disaster Risk Management Committee, the Settlement Disaster Risk Management Committee, and the Ministry of Agriculture, Water and Land Reform should be reviewed and rationalised. This will ensure that humanitarian assistance from donors and GRN is fully administered, coordinated, and successfully implemented to lessen the impact of the drought. The study further recommends that primary support should target the most vulnerable households only.

5.3.3 Establishment of water harvesting infrastructure in the community

This study recommends that there is an urgent need for the implementation and establishment of sufficient water harvesting infrastructures with the aim of complementing GRN efforts in addressing access to water in the community. To irrigate horticultural backyard gardens in the dry seasons with Oshana floodwater of appropriate quality, harvesting and storage techniques must be implemented by the community with the guidance, technical, and financial support from the lead Ministry of Agriculture, Water and Land Reform and other associate institutions. Niipare (2020) supports this proposed idea by emphasising that the approach of storing floodwater in the rainy season moderates the risks of drought. A considerate understanding of floodwater harvesting can be further developed while achieving employment creation and building the capacity of communal households.

5.3.4 Review and finalise the National Drought Policy and Strategy of 1997.

This study recommends that the Ministry of Agriculture, Water and Land Reform finalise the continuing review of the National Drought Policy and Strategy of 1997. The review of this policy and strategy was necessitated when the Ministry approached Cabinet with the intention of establishing a fund predominantly for drought events. A key limitation acknowledged was the need to establish a Drought Fund, which was never realised as per the provisions of the National Drought Policy and Strategy. This is because the Office of the Prime Minister has already established a National Disaster Fund. The Ministry should fast-track the review, finalisation, and full implementation of the National Drought Policy and

Strategy, as this will assist with effective, reasonable, and sustainable approaches to drought at the national level.

5.3.5 Creation of a fodder bank by communal households

This study recommends that communal households should consider the creation of a fodder bank, either at an individual household or community level. A fodder bank is required, since most communal farmers rely on humanitarian assistance from the African Development Bank to procure livestock feed. A fodder bank is of key importance as the accumulation of feed can be used as emergency feed by communal households in times of drought events when there is insufficient natural grazing to support livestock. A fodder bank may be created in several ways, such as (1) reserving sufficient grazing areas, (2) planting drought-resistant fodder crops, (3) planting fodder crops by means of cultivation, and (4) preserving crop remains from previous harvests.

5.3.6 Post-drought evaluation assessment by GRN

This study recommends a post-drought evaluation assessment of the whole response by communal households and key institutions such as GRN (central government), the Red Cross, WFP, FAO, and UNICEF. If post-drought evaluations are not implemented, it will be challenging to learn from past involvements, especially successes and mistakes, as this will aid in determining what approaches have worked and those that have not. Post-drought evaluation should contain a full assessment of the drought's climatic and environmental components, associated economic and social impacts, and the degree to which drought readiness planning was valuable in enabling relief to the most impacted communities. To ensure a fair approach, GRN may appoint an independent institution such as NUST to carry out the post-drought evaluation assessment.

5.3.7 Government drought recovery programme for communal households

This study recommends that the GRN, through the Ministry of Agriculture, Water and Land Reform, Traditional Authorities, Village Headmen, and respective Regional Councils, in particular Constituency Honourable Councillors, continuously profile vulnerable communal households. As a feasible recovery measure, these households should be assisted with breeding livestock such as goats that are easy to maintain, as this will assist in rebuilding their livestock herds. This suggested approach complements the current initiative of the Small Stock Distribution and Development Programme in Communal Areas

(SSDDCAs) that is being implemented by the Ministry of Agriculture, Water and Land Reform. The SSDDCAs give quality core breeding flocks of suitable local goats to vulnerable households in communal areas to revolve, generate income and increase food security.

5.4 Recommendations for further research

During the commissioning of this particular study, it emerged clearly that there is a need to understand the more representative dynamics of drought readiness, response, and recovery efforts of communal households by broadening the study area and investigating other common natural disasters. This will assist communal households in several parts of Namibia to implement appropriate strategies that are applicable to their geographical set-ups. The above-mentioned needs were beyond the scope of the study objectives and were underlined to be considered as areas of future research. More explicitly, these recommendations can be made:

5.4.1 Creating similar studies in diverse geographical locations and cultural set-ups in Namibia

The researcher reflects that since this particular study was limited to Outapi Constituency of Omusati region, the study approach, findings, and recommendations may not apply to other parts of the country, mainly because of diverse geographical setups, structures, and principles. It is recommended that a research study of this concept be conducted in other parts of Namibia, such as the southern, central, central eastern, and central western parts, while taking into account the factors specified above. Findings that emanate from this study may not fully apply to other parts, hence this recommendation with the aim of acquiring a broad, insightful view of the subject and addressing the research problem on a broad spectrum.

5.4.2 Creating a study with the same context on other natural disasters, such as floods

This study entirely assessed the readiness, response, and recovery efforts of communal farmers to drought events, particularly the 2018/19 agricultural drought. However, during the undertaking and interactions with the sampled communal households, the study notes that other natural calamities, in particular flood events, affect communal households with almost similar or diverse impacts as drought events. This study therefore suggests that a study focusing on the readiness, response, and recovery of

communal farmers to flood events in northern communal areas of Namibia could be a possible study that can be undertaken. This study will assist in understanding how different natural calamities impact the socio-economic livelihoods of inhabitants residing in areas prone to drought events, particularly in the northern communal areas. A deep understanding of the readiness, interventions, and recovery measures of communal households will be realised.

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Appendices

Appendix 1 Communal household questionnaire

ID NUMBER Researcher's use only	

Assessing drought readiness and recovery efforts of communal farmers towards the 2018/19 agricultural drought: A case study of Outapi Constituency in Namibia

CONFIDENTIAL

INTRODUCTORY STATEMENT

My name is _____ conducting a study for a Master in Natural Resources Management (09MNRM) at the Namibia University of Science and Technology. This study aims at assessing how prepared you were prior to the 2018/19 agricultural drought, how you responded during the drought, and how you recovered from the drought.

Our talk will comprise questions on demographic features of your household, employment status, household asset ownership, agricultural production, the impact of the 2018/19 drought, drought readiness strategies, drought response and interventions, and post-drought recovery strategies.

Thank you very much for your participation and time!

IDENTIFICATION INFORMATION

NAME AND CODE OF THE VILLAGE* _____ ☐

(1 = Eengolo; 2 = Okahwa-Kangamba; 3 = Okafitu-Kakafimbi; 4 = Okahwa-Kangweva; 5 = Okapuku; 6 = Omaputa)

FARM SIZE (HECTARES) ☐

PARTICULARS OF HOUSEHOLD OWNER

NAME OF THE HOUSEHOLD HEAD: _____

NAME OF CURRENT HOUSEHOLD HEAD: _____

If different from Namibia Communal Land Administration System

REASON FOR CHANGE IN HOUSEHOLD HEAD .....

.....

NAME OF THE PRIMARY RESPONDENT

_____

FIELD ADMINISTRATIVE INFORMATION

RESULT OF INTERVIEW: (1 = Completed; 2 = Partially completed; 3 = Non-contact; 4 = Refused; 5 = (Other: Specify) ☐

COMMENT FOR RESULT CODES 2 – 5

_____

DATE OF INTERVIEW (DD/MM) _____/_____/ 2022

NAME OF INTERVIEWER

_____ SIGNATURE OF INTERVIEWER _____

NAME OF SUPERVISOR

_____ SIGNATURE OF SUPERVISOR _____

a. Household composition

- Always start with the head of the household.
- Include household members who are not living in the household all the time, but who are supported by the household members, e.g. dependents such as children who are at school.
- In case of workers or other non-family members check if the they are sharing and cooking food with the household. If not, DO NOT record her/ him

PNO	Surname	First Name	Relationship to head of HH	Sex	Age	Marital status	Level of education
	TOTAL NUMBER OF HH MEMBERS ☐ List the surname and first names of all persons in this household, starting with the head of the household		What is the relationship of (NAME) to the head of the household?	Is (NAME) male or female? 1 = Male 0 = Female	How old is (NAME)?	What is (NAME'S) marital status?	What is (NAME)'s highest level of education?
			201	**202**	**203**	**204**	**205**
01			**HEAD**				
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							

Codes for Q201 **Relationship to head of HH**	**Codes for Q204** **Marital status**	**Codes for Q205** **Level of Education**
01 = Head 02 = Spouse/ Partner (Wife/Husband, Boy/Girlfriend) 03 = Son or Daughter of head/ spouse 04 = Adopted/ foster child/ step child 04 = Son/Daughter-in-law of head/ spouse 05 = Grandchild of head/ spouse 06 = Father/ Mother of head/ spouse 08 = Brother/ Sister of head/ spouse	01 = Single 02 = Married with certificate 03 = Married traditionally/customary 04 = Live in partnership 05 = Widowed 06 = Divorced or Separated 07 = Not applicable (12 years or less) 08 = Don't know	01 = No formal education 02 = Primary school completed 03 = Secondary school completed 04 = Some tertiary education (college or university) 05 = Tertiary education completed 06 = Not applicable (5 years or less) 07 = Don't know

09 = Other relative 10 = Other non-relative 11 = Don't know		

b. Source of household income

PNO	First Name and Surname	Employment status	Source of employment
	COPY THE NAME AND SURNAME OF THE HEAD OF THE HOUSEHOLD AS IT APPEARS IN THE TABLE ABOVE	What is the **employment status of the Head of the Household**?	What is the **source of employment of the Head of the Household**?
		206	**207**
01			
		Codes for Q206 Employment status	**Codes for Q207 Source of employment**
		01 = Working full-time 02 = Working part-time 03 = Working seasonally/casual/ temporary 04 = Not working – looking for work 05 = Pension/ other social grant receiver 06 = Remittance receiver 07 = Scholar/ student 08 = Unemployed (health reasons, disability) 09 = Don't know	01 = Farmer (full-time) 02 = Farmer (part-time) 03 = Businessman/ woman (non-rural)(formal) 04 = Businessman/ woman (small rural business) **Wage labour:** 05 = Manager 06 = Professional 07 = Technician 08 = Clerical worker 09 = Support worker 10 = Services and sales worker 11 = Skilled manual worker 12 = Unskilled manual worker 13 = Agricultural worker (paid) 14 = Agricultural worker (unpaid) 15 = Domestic worker **Others: Pensioners/ No income/ Unpaid workers** 16 = Volunteer – working for NGO/charity 17 = Retired /Pensioner 18 = Housewife/ Homemaker 19 = Scholar/ Student 20 = School leaver (no employment/ work experience yet) 21 = Don't know

c. Household asset ownership

QNO	Questions and filters	Responses					Skip
208	Is there a physical dwelling unit present? ***Observe and circle in the appropriate box.***	Yes	01	No	0		**IF 'NO' -> TO Q210**
209	What is the type of physical dwelling present? ***Observe and circle ONE appropriate response.***	Brick house				01	
		Corrugated iron house				02	
		Improvised housing unit				03	
		Traditional dwelling				04	
		Mobile home/tent				05	
210	Are there agricultural implements/equipment present? ***Circle in the appropriate box.***	Yes	01	No	0		**IF 'NO' -> TO Q212**

211	What type of agricultural (light & heavy) implements/equipment are present? ***Circle ALL that apply.***	Disc ploughs			01	
		Mahangu thresher			02	
		Chissel			03	
		Spade			04	
		Ridgers			05	
		Farm trailer			06	
		Tractor loader			07	
		Fertilizer spreader			08	
		Tractor			09	
		Ox/donkey-drawn plough			10	
		Weeding hoes			11	
		Other (specify)_____			12	
212	Are there non-agricultural implements present? ***Circle in the appropriate box.***	Yes	01	No	0	**IF 'NO' -> TO Q214**
213	What type of non-agricultural implements/equipment are present? ***Circle ALL that apply.***	Axe			01	
		Wheel barrow			02	
		Concrete mixer			03	
		Donkey cart			04	
		Welding machine			05	
		Generator			06	
		Other (specify)_____			07	

d. Agricultural production

QNO	Questions and filters	Responses				Skip
214	What size of agricultural land does the household occupy? ***Circle only ONE.***	0-5 Hectares			01	
		5-10 Hectares			02	
		10-15 Hectares			03	
		15-20 Hectares			04	
		20-25 Hectares			05	
		25-30 Hectares			06	
		30 Hectares and more			07	
215	What is the size of the arable land under agricultural production? ***Circle only ONE.***	0-5 Hectares			01	
		5-10 Hectares			02	
		10-15 Hectares			03	
		15-20 Hectares			04	
		20-25 Hectares			05	
		25-30 Hectares			06	
		30 Hectares and more			07	
216	Do you lease land for agricultural purposes? ***Circle in the appropriate box.***	Yes	01	No	0	**IF 'NO' -> TO Q218**
217	What is the size of the land leased for agricultural purposes? ***Circle only ONE.***	0-5 Hectares			01	
		5-10 Hectares			02	
		10-15 Hectares			03	
		15-20 Hectares			04	
		20-25 Hectares			05	
		25-30 Hectares			06	
		30 Hectares and more			07	

218	Does the household grow crops and vegetables? ***Circle in the appropriate box.***	Yes	01	No	0	**IF 'NO' -> TO Q221**

219	Types of crops and vegetables grown? ***Circle ALL that apply; and please indicate the average yearly yield in Kilograms.***	**Types of crops/vegetables grown**		**Average yearly yield**	
		Mahangu/Pearl millet	01		
		Sorghum	02		
		Maize	03		
		Groundnut	04		
		Beans	05		
		Potatoes	06		
		Sweet potato	07		
		Cabbage	08		
		Onion	09		
		Carrot	10		
		Spinach	11		
		Pepper	12		
		Tomato	13		
		Water melon	14		
		Animal fodder e.g. Lucerne	15		
		Other (specify)_____	16		
220	Type of marketing of crops and vegetable products? ***Circle ALL that apply.***	Formal market			01
		Informal market			02
		Household consumption			03
		Do not market			04

221	Do you rear livestock? ***Circle in the appropriate box.***	Yes	01	No	02	**IF 'NO' -> TO Q224**

222	Type of livestock reared, and the current number? ***Circle ALL that apply; and please provide the current livestock number.***	**Types of livestock reared**		**Current number**	
		Cattle	01		
		Sheep	02		
		Goats	03		
		Pigs	04		
		Poultry	05		
		Donkeys	06		
		Horses	07		
		Other (specify)_____	08		
223	Type of livestock marketing? ***Circle ALL that apply.***	Formal market			01
		Informal market			02
		Household consumption			03
		Do not market			04

e. Impact of the 2018/19 drought

QNO	Questions and filters	Responses			Skip
224	How long was the drought period in your area? ***Circle only ONE.***	0-4 Months		01	
		4-8 Months		02	
		8-12 Months		03	
		12-16 Months		04	
		16-20 Months		05	
		20-24 Months		06	
		24 Months and beyond		07	
		Prior to Drought	**During Drought**		

225	How was the grazing conditions in the area prior to; and during the drought period? ***Circle only ONE response for each category.***	Very poor	01	Very poor	01	
		Poor	02	Poor	02	
		Average	03	Average	03	
		Good	04	Good	04	
		Excellent	05	Excellent	05	
226	How was the water situation in the area prior to; and during the drought period? ***Circle only ONE response for each category.***	**Prior to Drought**		**During Drought**		
		Very poor	01	Very poor	01	
		Poor	02	Poor	02	
		Average	03	Average	03	
		Good	04	Good	04	
		Excellent	05	Excellent	05	
227	What was the extent on crop production losses prior to; and during the drought period? ***Circle only ONE response for each category.***	**Prior to Drought**		**During Drought**		
		Mild	01	Mild	01	
		Moderate	02	Moderate	02	
		Severe	03	Severe	03	
		Very severe	04	Very severe	04	
228	Livestock mortalities experienced during the drought? ***Circle ALL that apply; and please provide the number of livestock losses.***	**Types of livestock lost**		**Number of livestock lost**		
		Cattle	01			
		Sheep	02			
		Goat	03			
		Pig	04			
		Poultry	05			
		Donkey	06			
		Horses	07			
		Other (specify)_____	08			
229	Do you think drought had negative impacts on the environment? ***Circle only ONE. If the answer is <u>No</u> or <u>I don't know</u> skip to Q231.***	Yes			01	
		No			02	
		I don't know			03	
230	If yes, how does drought negatively impact the environment? ***Circle ALL that apply.***	Reduction of fish in water sources			01	
		Degradation of natural animal habitat			02	
		Lack of drinking water for livestock and human consumption			03	
		Lower water levels in water sources			04	
		Reduced streamflow			05	
		Reduced soil quality			06	
		Increased quantity of dust			07	
		Death of vegetation and trees			08	
		Other (specify)_____			09	

f. Drought readiness strategies

QNO	Questions and filters	Responses		Skip
231	What **strategies** or **measures** did the household employ as **readiness** for drought effects on livestock production? ***Circle ALL that apply.***	Livestock destocking	01	
		Livestock relocation	02	
		Livestock supplementary feeds	03	
		Drought resilient/indigenous breeds	04	
		Early warning/advice	05	
		Other (specify)_____	06	
232	What **strategies** or **measures** did the household employ as **readiness** for drought effects on crops and vegetable production? ***Circle ALL that apply.***	Drought resistant crops	01	
		Irrigation of crop/vegetable fields	02	
		Establishment of backyard gardens	03	
		Dry/early planting/ploughing	04	
		Mixed cropping	05	

		Mulching	06	
		Weeding	07	
		Seed density reduction	08	
		Early warning/advice	09	
		Other (specify)_____	10	

g. Drought interventions

QNO	Questions and filters	Responses		Skip
233	What are the **interventions** or **response mechanisms** did the household employ to be able to cope during the drought? ***Circle ALL that apply.***	Dietary reduction	01	
		Food seeking	02	
		Drought relief parcels	03	
		Food reserves	04	
		Selling household items	05	
		Other (specify)_____	06	
234	What **soil** and **water management strategies** did the household employ to cope during the drought? ***Circle ALL that apply.***	Set up irrigation	01	
		Backyard garden establishment	02	
		Crop/vegetable windbreak	03	
		Water conservation	04	
		Soil erosion prevention	05	
		Controlled litter disposal	06	
		Good tillage practices	07	
		Other (specify)_____	08	
235	What **livestock management strategies** did the household employ to cope with during the drought? ***Circle ALL that apply.***	Destocking	01	
		Early warning/advice	02	
		Herd separation	03	
		Parasite control	04	
		Feed licks	05	
		Supplement fodder	06	
		Establishment of new water points	07	
		Other (specify)_____	08	

h. Post-drought recovery strategies

236	What **post-drought recovery strategies** did the household employ to recover from the drought effects? ***Circle ALL that apply.***	Rebuild livestock herd	01	
		Debt repayment extension to financial institutions	02	
		Compensation by GRN	03	
		Compensation by insurance companies	04	
		Other emergency funds	05	
		Agricultural diversification	06	
		Provision of sufficient water points	07	
		Access to drought tolerance and improved seeds from GRN	08	
		Access to training on conservation agriculture	09	
		Better crop management practices	10	
		Capacity building of communal farmers	11	
		Other (specify)_____	12	

i. Key structural and institutional support systems

237		Local government (Government of the Republic of Namibia)	01	
		Non-governmental organisations	02	
		Community based organisations	03	

	What are the organizational support institutions present in your community? ***Circle ALL that apply.***	Other (specify)_____	04	
238	What community support services does your household have access to? ***Circle ALL that apply.***	Food parcel	01	
		Community income generating projects	02	
		Agricultural extension services	03	
		Health support	04	
		Education and Training services	05	
		Other (specify)_____	06	
239	What type of early warning systems are present in your community? ***Circle ALL that apply.***	Community meteorological station	01	
		International media	02	
		Local media	03	
		Community/traditional leaders	04	
		Other (specify)_____	05	
240	How is the information about early warning systems communicated to your community? ***Circle ALL that apply.***	Local radio stations	01	
		Visual media e.g. Televisions	02	
		Print media e.g. Newspaper	03	
		Agricultural Extension Officers	04	
		Phone (Calls or Text Messages)	05	
		Other (specify)_____	06	
241	Rate the level of reliability of early warning systems in your community? ***Circle ALL that apply.***	Fairly reliable	01	
		Reliable	02	
		Very reliable	03	
		Not reliable	04	
		Other (specify)_____	05	
242	In your opinion, what needs to be done in order to strengthen communal farmers' drought readiness at the household level?	…… …… …… …… …… …… …… …… ……		
243	In your opinion, what needs to be done in order to strengthen communal farmers' drought coping at the household level?	…… …… …… …… …… …… …… …… ……		
244	In your opinion, what needs to be done in order to strengthen communal farmers' ability to recover from drought at the household level?	…… …… …… …… …… …… …… ……		

Thank you very much for your time and cooperation!

Appendix 2 Key Informant questionnaire

KEY INFORMANT INTERVIEW QUESTIONNAIRE

Assessing drought readiness and recovery efforts of communal farmers towards the 2018/19 agricultural drought: A case study of Outapi Constituency in Namibia

CONFIDENTIAL

INTRODUCTORY STATEMENT

My name is _____ conducting a study for a Master in Natural Resources Management (09MNRM) at the Namibia University of Science and Technology. This study aims to assess the level of readiness by communal farmers prior to the 2018/19 agricultural drought, analyse drought interventions employed by communal farmers during the drought period, and analyse post-drought recovery strategies employed by communal farmers.

Our talk will comprise questions on the roles and responsibilities of your institution, 2018/19 agricultural drought effects, drought as a challenge, drought readiness, drought interventions, and recovery measures observed being employed. However, aspects on key structural and institutional support systems will be covered.

Thank you very much for your participation and time!

QNO	QUESTIONS	RESPONSES
01	Briefly indicate the roles, or functions of your institution?	…… …… …… …… …… …… …… …… ……
02	Briefly state the challenges associated with drought in the northern communal areas?	…… …… …… …… …… …… …… …… ……
03	How did the 2018/19 agricultural drought affect the social well-being of northern communal farmers, in your opinion?	…… …… …… …… …… …… …… …… ……
04	How did the 2018/19 agricultural drought affect the financial well-being of northern communal farmers, in your opinion?	…… …… …… …… …… …… …… …… ……
05	What, in your opinion, were the environmental consequences of the 2018/19 agricultural drought on northern communal farmers?	…… …… …… …… …… …… …… …… ……
06	How did the 2018/19 agricultural drought affect food security among	…… …… ……

	northern communal farmers, in your opinion?	…… …… …… …… …… ……
07	What educational impacts, in your opinion, has the 2018/19 agricultural drought had on the livelihoods of northern communal farmers?	…… …… …… …… …… …… …… …… ……
08	How did the 2018/19 agricultural drought affect commodity prices in northern communal areas, in your opinion?	…… …… …… …… …… …… …… …… ……
09	How did the 2018/19 agricultural drought affect the agricultural productivity of northern communal farmers, in your opinion?	…… …… …… …… …… …… …… …… ……
10	In your view, which household categories of northern communal farmers were affected the hardest by the 2018/19 agricultural drought?	…… …… …… …… …… …… …… …… ……
11	In your view, what strategies did northern communal farmers employ to prepare for drought?	…… …… …… …… …… …… ……

		…… ……
12	Were the strategies mentioned in Q11 effective in preparing for drought, in your opinion?	…… …… …… …… …… …… …… …… ……
13	In your view, what strategies did northern communal farmers employ as a means of intervention during the drought period?	…… …… …… …… …… …… …… …… ……
14	Were the strategies mentioned in Q13 effective in mitigating drought severity, in your opinion?	…… …… …… …… …… …… …… …… ……
15	In your view, what strategies did northern communal farmers employ to recover from the 2018/19 agricultural drought?	…… …… …… …… …… …… …… …… ……
16	Were the strategies mentioned in Q15 effective in aiding with drought recovery?	…… …… …… …… …… …… …… …… ……
17	Are there structures or institutions that render	…… ……

	support to northern communal farmers in events of drought? If yes, please name them.	…… …… …… …… …… …… ……
18	Briefly state the kind of support that your institution rendered to northern communal households as part of drought readiness?	…… …… …… …… …… …… …… …… ……
19	Briefly state the kind of support that your institution rendered to northern communal households as part of drought intervention?	…… …… …… …… …… …… …… …… ……
20	Briefly state the kind of support that your institution rendered to northern communal households as part of drought recovery?	…… …… …… …… …… …… …… …… ……
21	Briefly state the challenges that your institution is faced with when dealing with issues pertaining to drought?	…… …… …… …… …… …… …… …… ……
22	Recommend ways that institutions can employ for effective drought preparation on northern communal farmers?	…… …… …… …… …… …… ……

		…… ……
23	Recommend ways that institutions can employ for effective drought response on northern communal farmers?	…… …… …… …… …… …… …… …… ……
24	Recommend ways that institutions can employ for effective recovery efforts on northern communal farmers while building drought resilience at household level?	…… …… …… …… …… …… …… …… ……

Thank you very much for your time and cooperation!

Appendix 3 Approval of communal household datasets from the Ministry

REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND LAND REFORM

Tel: (+264 61) 2087649
Fax: (+264 61) 221733
Enquiries: ED@mawlr.gov.na

Government Office Park
Private Bag 13184
WINDHOEK

INTERNAL MEMORANDUM

TO : Gerson Aileka
CHIEF DEVELOPMENT PLANNER: LAND STATISTICS

FROM : Ndiyakupi Nghituwamata
ACTING EXECUTIVE DIRECTOR

EXECUTIVE DIRECTOR
2022 -04- 22
Republic of Namibia
Ministry of Agriculture, Water and Land Reform

DATE : 19 April 2022

SUBJECT : **REQUEST FOR TECHNICAL ASSISTANCE ON THE DATA SETS OF COMMUNAL HOUSEHOLDS FOR ACADEMIC SAMPLING PURPOSES**

1. Reference is made to the attached letter of request, dated 24 March 2022.

2. The Ministry of Agriculture, Water and Land Reform would like to acknowledge receipt of your letter seeking technical assistance pertaining to an academic study titled "Assessing drought readiness and recovery efforts of communal farmers: A case study of Outapi Constituency".

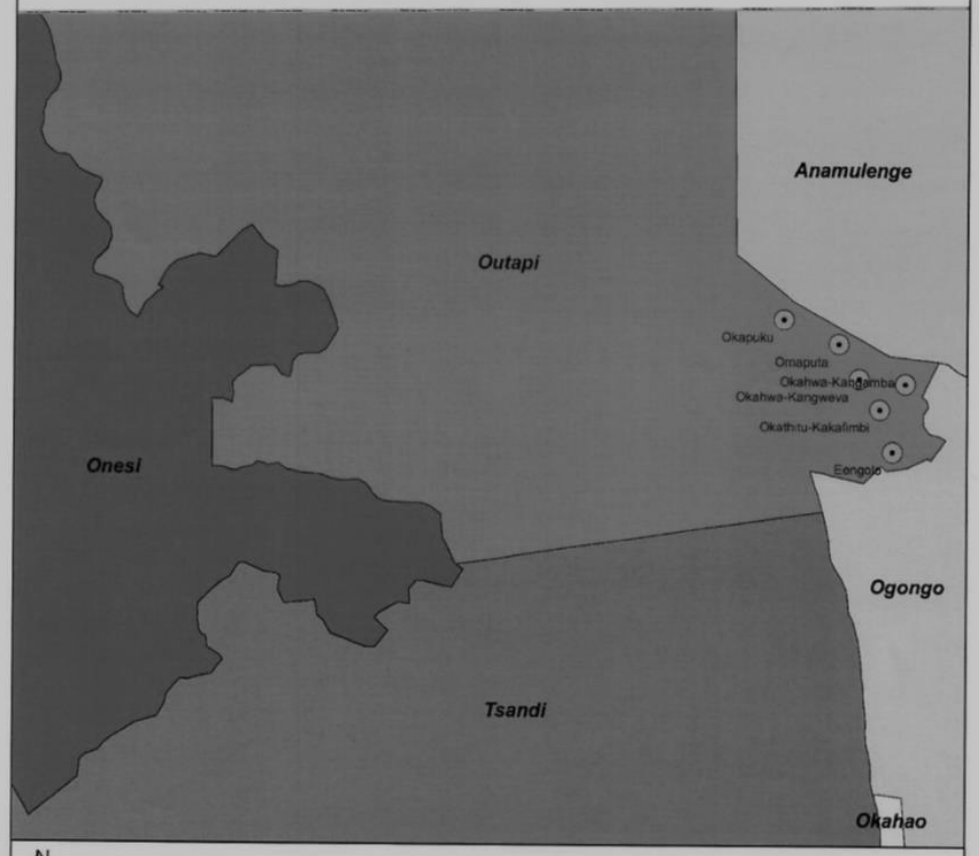
3. As per the attached request assistance sought are data sets containing sheets with lists of all communal households of the targeted and selected six (6) villages in Outapi Constituency namely: (1) Eengolo, (2) Okahwa-Kangamba, (3) Okathitu-Kakafimbi, (4) Okahwa-Kangweva, (5) Okapuku and (6) Omaputa, all accommodated on the Namibian Communal Land Administration System.

4. You are hereby informed that your request has been approved and forwarded to the Directorate of Resettlement and Regional Programme Implementation for their outmost attention and support. Please, contact the Director, Mr. Alfred Sikopo at 0811223442 for any queries.

Regards,

All official correspondences must be addressed to the Executive Director

Map of Study Area:
Assessing the drought readiness and recovery efforts of communal farmers:
A case study of Outapi Constituency



N

0 3.75 7.5 15 22.5 30 Kilometers

Coordinate System: New Namibia
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 600 000.0000
False Northing: 10 000 000.0000
Central Meridian: 17.0000
Scale Factor: 1.0000
Latitude Of Origin: 0.0000
Units: Meter

Legend

- Study Area
- Anamulenge
- Elim
- Etayi
- Ogongo
- Okahao
- Okalongo
- Onesi
- Oshikuku
- Otamanzi
- Outapi
- Ruacana
- Tsandi
- Regional boundary

Malcon Mazambani
Date: 2021/05/20

MR Silenpo for your attention and advice on the way forward
P.O
28/03/2022

Mr Gerson Aileka
P.O.Box 95184
SOWETO
WINDHOEK

24 March 2022

Ms Ndiyakupi Nghituwamata
Acting Executive Director
Ministry of Agriculture, Water and Land Reform
Private Bag 13184
Government Office Park
WINDHOEK

Dear Ms Nghituwamata,

REF: REQUEST FOR TECHNICAL ASSISTANCE ON THE DATABASE OF COMMUNAL HOUSEHOLDS FOR SAMPLING

This letter serves to inform that I'm a final year post-graduate student (student number: 201061732) at the Namibia University of Science and Technology pursuing a Master of Natural Resources Management (09MNRM) by research in the Department of Agriculture and Natural Resources Sciences.

Since this Master is by research, I will be conducting a study that will assess drought readiness and recovery efforts of communal farmers: A case study of Outapi Constituency. Briefly, this study will assess the level of preparedness of communal farmers prior to the 2018/2019 drought; analyse drought interventions employed during the drought period; and to analyse post-drought recovery strategies employed by communal farmers.

I'm hereby requesting technical assistance and support from the Ministry of Agriculture, Water and Land Reform specifically from the Directorate of Resettlement and Regional Programme Implementation. Hence, there is a need to select a representative sample size of communal households (Primary Sampling Units) from particular villages of Outapi Constituency accommodated on the Namibian Communal Land Administration System (NCLAS). Since the Ministry is mandated to administer data and information pertaining to communal land related matters, the administration of the NCLAS plays a key role in this study.

Please, see enclosed approved inclusive, and summary study proposal, and proof of registration for your information and kind consideration.

Your assistance is highly requested to ensure the successful completion of this study. All queries should be directed to myself (Mr Aileka), email address: gerryaileka@gmail.com, phone number: 0814641986.

Yours sincerely,

24/03/2022

Gerson Aileka
Master's student

Appendix 4 Permission letter for fieldwork from NUST

NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Faculty of Health, Applied Sciences and Natural Resources
Department of Agriculture and Natural Resources Sciences

13 Jackson Kaujeua Street
Private Bag 13388
Windhoek
NAMIBIA

T: +264 61 207 2141
F: +264 61 207 9141
E: dnas@nust.na
W: www.nust.na

05 June 2022

TO WHOM IT MAY CONCERN

This letter serves to inform you that **Mr Gerson Aileka** (Student number: 201061732) is a registered student with the Department of Agriculture and Natural Resource Sciences (DANRS) at the Namibia University of Science and Technology (NUST) studying towards a Master of Natural Resources Management (NQF level 9). He has partially fulfilled the requirements for this degree by submitting a research proposal. The next step is for him to collect the required data for his research. His selected study area is Outapi Constituency of Omusati Region in Namibia. He plans to undertake fieldwork in the above-mentioned study area during the period of June-August 2022.

May you kindly provide him with the necessary support for his research to be successful.

Please feel free to contact me for additional information (thmoyo@nust.na).

Sincerely,
Dr Thinah Moyo
Research Supervisor
Senior Lecturer: Agricultural economics

Digitally signed by Thinah Moyo
DN: cn=Thinah Moyo, o=NUST, ou=DANRS, email=thmoyo@nust.na, c=NA
Date: 2022.06.06 00:10:52 +02'00'

Signature: ----------

Approved by,
Dr Jonathan Kamwi
Head of Department (DANRS)

Jonathan Kamwi, PhD
2022.06.07 10:53:32 +02'00'

Signature: ----------

Appendix 5 Data collection request letter to Omusati Regional Council

Mr Gerson Aileka
P. O. Box 169
OUTAPI
OMBALANTU

22 June 2022

The Chief Regional Officer
Omusati Regional Council
Private Bag 523
OUTAPI

Greetings,

REF: REQUEST FOR AUTHORIZATION TO CONDUCT AN ACADEMIC STUDY IN OUTAPI CONSTITUENCY

This letter serves to inform that I'm a final year post-graduate student (student number: 201061732) at the Namibia University of Science and Technology pursuing a Master of Natural Resources Management (09MNRM) by research in the Department of Agriculture and Natural Resources Sciences.

Since this Master is by research, I will be conducting a study that will assess drought readiness and recovery efforts of communal farmers: A case study of Outapi Constituency. Briefly, this study will assess the level of preparedness of communal farmers prior to the 2018/2019 drought; analyse drought interventions employed during the drought period; and to analyse post-drought recovery strategies employed by communal farmers.

I'm hereby requesting your Office to grant me authorization to conduct the data collection phase through face-to-face interviews from sampled households (Primary Sampling Units) from particular villages (Okahwa-Kangamba; Okafitu-Kakafimbi; Omakuku; Okapuku and Omaputa) of Outapi Constituency accommodated on the Namibian Communal Land Administration System.

Please, see enclosed approval letter from NUST and summary study proposal for more in-depth information and kind consideration.

Your assistance is highly requested to ensure the successful completion of this study. All further queries should be directed to myself (Mr Aileka), email address: gerryaileka@gmail.com, phone number: 0814641986/0612965320.

Yours sincerely,

22/06/2022

Gerson Aileka
Master's student

Appendix 6 Authorization letter for fieldwork from Omusati Regional Council

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

OFFICE OF THE CHIEF REGIONAL OFFICER

Tel: +264 65 251019
Fax: +264 65 251078 / 088639090
E-mail: info@omusatirc.gov.na
Website: www.omusatirc.gov.na
Our Ref: 11/S.5/R
Enquiries: Mrs. Ester Hipangelwa

Erf 1080 Namaungu Street
Private Bag 523
OUTAPI

28 June 2022

Mr. Gerson Aileka
P.O Box 169
OUTAPI

Dear Mr. Aileka

SUBJECT: REQUEST FOR AUTHORIZATION TO CONDUCT AN ACADEMIC STUDY WITHIN OUTAPI CONSTITUENCY

1. Omusati Regional Council hereby acknowledge receipt of your Letter dated 22 June 2022 regarding the above - mentioned subject.

2. Thus, it is a pleasure to inform you, that permission has been granted to conduct an academic study on how drought readiness and recovery efforts of communal farmers: A Case Study of Outapi Constituency as requested. The Permission is granted on condition that data obtained during your research will be used for study purposes only and requested to furnish a copy of your findings to the Regional Council upon completion of your research.

3. In addition, you are advised to report yourself to the Learning and Development Officer, Ms. Ester Hipangelwa before you embark on your interview with the respective officials within Omusati Regional Council.

Sincerely,

29/06/2022

Gervasius Kashindi
CHIEF REGIONAL OFFICER

OMUSATI REGIONAL COUNCIL P/BAG 523 OUTAPI 2022 -06- 29 NO. 4 TEL: 065-251019 FAX: 065-251078

Appendix 7 Authorization letter from Ombalantu Traditional Authority

Okahwa-Kangamba
OMBALANTU
OUTAPI

22 June 2022

Ombalantu Traditional Authority
P. O. Box 437
OUTAPI

Greetings,

REF: CERTIFICATION LETTER FOR MR. GERSON AILEKA (ID No: 92022900138)

This letter serves to inform you that Mr Gerson Aileka ID Number: 92022900138 is a final year post-graduate student at the Namibia University of Science and Technology (NUST) pursuing a Master of Natural Resources Management (09MNRM) by research in the Department of Agriculture and Natural Resources Sciences.

I, Teofilus Oshoshange Oskali ID No: 42030800023, Headman of Okahwa-Kangamba Village within Ombalantu Traditional Authority hereby certify that Mr G. Aileka is a resident of Okahwa-Kangamba village and hereby requesting your Office to grant him authorization to conduct the data collection phase of his study through face-to-face interviews from all sampled households (Primary Sampling Units) from particular villages (Okahwa-Kangamba; Okafitu-Kakafimbi; Omakuku; Okapuku and Omaputa) of Outapi Constituency accommodated on the Namibian Communal Land Administration System.

Mr G Aileka will conduct a study that will assess drought readiness and recovery efforts of communal farmers: A case study of Outapi Constituency. Briefly, this study will assess the level of preparedness of communal farmers prior to the 2018/2019 drought; analyse drought interventions employed during the drought period; and to analyse post-drought recovery strategies employed by communal farmers.

Please, see enclosed approval letter for fieldwork from NUST for more in-depth information and kind consideration.

Your assistance is highly requested to ensure the successful completion of this study. All further queries should be directed to Mr Aileka, email address: gerryaileka@gmail.com, phone number: 0814641986/0612965320.

Yours sincerely,

.....

Teofilus Oshoshange Oskali
Headman: Okahwa-Kangamba Village

THE HEADMAN
OKAHWA KANGAMBA
23 JUN 2022
OSHOSHANGE OSKALI TEOFELUS
CELL: 081 215 5139
OMBALANTU

ELELO LYOSHILONGO
OMBALANTU
OMUSATI REGION
22 -06- 2022
OMBALANTU TRADITIONAL AUTHORITY
P.O. BOX 437 OUTAPI
TEL: 065 - 251 602