EVALUATING THE IMPACT OF DEFORESTATION ON THE LIVELIHOODS AND CULTURE OF COMMUNITIES IN OTSHIKU-SHIITHILONDE COMMUNITY FOREST, NAMIBIA

by

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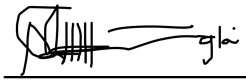
Declaration

I, Shivute Ndeshimona Ngeendina Nangula hereby affirm that the whole of the work contained in this research report is my own work. I am the individual author thereof. I declare that reproduction and publication of this research paper by the University of the Free State (UFS) will not infringe any third party rights. I further declare that I have not previously, in its entirety or in part, submitted this dissertation to any other tertiary institution to obtain any qualification, other than to the UFS.

The work of other researchers and authors have been herein acknowledged accordingly.



31 January 2020

Student signature *Date*

Dedication

I dedicate this work to my parents, my father, Mr Pinehas Nangula and mother, Ms Rosalia Namutenya Nangula for the roles they have played all through my life. I would not have made it this far, had it not been for the enduring courage, spiritual, moral and financial support they gave me throughout this journey. Thank you for your unending coaching, mentorship and for believing in my abilities. I am forever grateful and indebted to you.

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Abstract

Over 5.8% of forest cover has been lost globally between 2010 and 2017 as a result of both natural and anthropogenic factors. These losses occurred as a result of inaction or lack of participation by relevant authorities and local communities in environmental management affairs and conservation programmes. Local people, especially the poor communities in Namibia depend on natural resources as their livelihood capital. Overharvesting of natural resources combined with subsistence farming practices contribute to the loss of forests. This study aimed at evaluating the impact of deforestation on the livelihoods and culture of communities in the Otshiku-shiIthilonde Community Forest (OCF). The data for the study was obtained qualitatively through face-to-face interviews with ninety-eight (98) randomly selected participants guided by a semi-structured questionnaire as the main data collection tool. A focus group discussion was also undertaken with key informants comprised of members of the Otshiku-shiIthilonde Community Forest management body and a Forest Technician of the Ministry of Agriculture, Water and Forestry - Directorate of Forestry. According to the findings of the survey, it was revealed that 51% of the respondents do not have alternative sources of livelihood apart from the forest. Poverty, the high demand for natural resources and natural factors (veld fires) were identified as key factors of deforestation in the OCF. Drought is a consequence of deforestation that negatively impacts crop and livestock productions which majority of the communities in the OCF depend for their livelihood. The substantial reduction of woody construction materials, reduced availability of forest food products and shelter for both humans and livestock, and the loss of culturally important trees are prominent impacts of deforestation on the culture of communities in OCF. Deforestation and its impacts thereof can be addressed through effective and efficient human interventions, particularly programmes that aim to address and consolidate the interactions between humans and the environment. The Otshiku-shiIthilonde Community Forestry programme and the application of indigenous/local knowledge can be effective measures of ensuring Sustainable Forest Management (SFM), reducing disaster risks and vulnerabilities of the local communities to climate-related risks such as floods and droughts.

Keywords: Otshiku-shiIthilonde Community Forest, deforestation, indigenous knowledge, forest, livelihoods, disaster risks, Sustainable Forest Management.

Table of Contents

Declaration i
Dedication ii
Acknowledgement iii
Abstract iv
List of figures viii
List of Tables ix
Definitions of terms x
List of abbreviations xii
CHAPTER 1. Introduction and study background 1
1.1. Introduction 1
1.2. Background of the study 2
1.3. Description of the study area 4
1.3.1. Climate 5
1.3.2. Vegetation and topography 5
1.4. Problem statement 6
1.5. Study aim and objectives 7
1.6. Research questions 8
1.7. Significance of the study 8
1.8. Delimitations 9
1.9. Chapter summary 10
CHAPTER 2. Theoretical and Legislative Framework 11
2.1. Introduction 11
2.2. Theoretical framework for forest system 11
2.2.1. The socio-ecological system 12
2.2.2. The Neo-structuralism system 19
2.3. Disaster management cycle 23
2.3.1. Pre-disaster risk reduction phase 25
2.4. Legislative Framework 25
2.4.1. The Sendai Framework for Disaster Risk Reduction (2015-2030) 25
2.4.2. Namibian Constitution 26
2.5. Chapter summary 30
CHAPTER 3. Literature Review 31
3.1. Introduction 31
3.2. Deforestation on a global scale 31

3.3. Deforestation in Namibia 33
3.4. The importance of forests to local communities 35
3.5. Immediate factors contributing to deforestation 36
3.6. Effects of deforestation 38
3.6.1. The effect of deforestation on people's livelihoods 38
3.6.2. Impacts of deforestation on indigenous cultures 40
3.7. Environmental effects of deforestation 42
3.7.1. Deforestation and desertification 42
3.7.2. Deforestation and climate change 43
3.7.3. Deforestation and disasters 44
3.8. Deforestation and forest ecosystems 46
3.8.1. Tropical forests 47
3.8.2. Temperate forests 48
3.8.3. Boreal forests 48
3.9. Strategies for Sustainable Forest Management 48
3.9.1. Indigenous knowledge and forest management 49
3.9.2. Community-based forest management in Namibia 52
3.10. Chapter summary 56
CHAPTER 4. Research Methodology 57
4.1. Introduction 57
4.2. Research philosophy 57
4.3. Research design 58
4.3.1. Qualitative method 59
4.3.2. Method justification 60
4.4. Study population 61
4.5. Sample and sampling 61
4.6. Research instruments 63
4.6.1. Semi-structured questionnaire 64
4.6.2. Focus group discussion 64
4.7. Data reliability and validity 65
4.8. Ethical consideration 65
4.9. Data analysis and presentation 66
4.10. Limitations 67
4.11. Chapter summary 68
CHAPTER 5. Data analysis and presentation 69

5.1. Introduction 69
5.2. Socio-demographic and socio-economic characteristics 69
5.2.1. Age and gender segregation of respondents 69
5.2.2. Duration of residence in Otshiku-shiIthilonde Community Forest 71
5.2.3. Farming activities 72
5.2.4. The value of forests to communities of OCF 72
5.2.5. Alternative livelihood sources 74
5.3. Deforestation 75
5.3.1. Factors of deforestation in Otshiku-shiIthilonde Community Forest 76
5.3.2. Impact of agricultural activities on the forest 78
5.4. The impacts of deforestation 79
5.4.1. Impact of deforestation on communities' livelihoods 80
5.4.2. Impact of deforestation on the culture of communities in Otshiku-shiIthilonde Community forest 82
5.5. Sustainable Forest Management 85
5.5.1. The importance of conserving forests 85
5.5.2. Participation of local communities in Sustainable Forest Management 86
5.5.3. Effectiveness of Community Forestry Programme for Sustainable Forest Management 89
5.5.4. Local and indigenous knowledge applied in forest management 91
5.6. Chapter summary 92
CHAPTER 6. Conclusion and Recommendations 93
6.1. Introduction 93
6.2. Conclusions 93
6.3. Recommendations 96
6.4. Suggestions for further research 97
References 98
Appendices 114
Appendix I: Statement of Informed Consent 114
Appendix II: Research Questionnaire for the face to face interviews 116
Appendix III: Focus-group-discussion Questions 123
Appendix IV: Consent letter from the Ministry of Agriculture, Water and Forestry 124
Appendix V: Language Editor Certificate 126
Appendix VI: Ethical clearance Certificate 127

List of figures

Figure 1.1: Location and Map of Otshiku-shiIthilonde Community Forest, Namibia.. 6
Figure 2.1: The Socio-ecological system.....13
Figure 2.2: The Context-Practice-Belief System.....21
Figure 2.3: The Disaster Management Cycle 24
Figure 3.1: Gazetted community forests in Namibia.....55
Figure 5.1: Age distribution of respondents.. 70
Figure 5.2: Gender distribution of respondents. 71
Figure 5.3: Value of forest resources to communities. 73
Figure 5.4: Impact of agricultural/indigenous activities on the forest.. 79
Figure 5.5: Impact of deforestation on culture of communities in OCF.....83
Figure 5.6: Importance of conserving forest resources.....86
Figure 5.7: Effectiveness of community forestry programme in curbing deforestation and ensuring SFM.....90

List of Tables

Table 4.1: Villages surveyed for this study.....62
Table 5.1: Duration of residence of respondents in OCF.. 71
Table 5.2: Importance of agricultural/indigenous activities to local communities......72
Table 5.3: Ratings of forest resources.....74
Table 5.4: Respondents' awareness of deforestation.. 75
Table 5.5: Ratings of deforestation factors.. 77
Table 5.6: Perceptions on the widespread of Otshiku-shiIthilonde community forest.....80
Table 5.7: Impact of deforestation on communities' livelihoods.. 81
Table 5.8: Participation of local people in SFM.. 88

Definitions of terms

Agro-pastoralists are people or communities who have livestock and cultivate crop fields on subsistence basis to feed and sustain their households. The Aawambo ethnic group are well-known agro-pastoralists (LRDC, 2012).

Culture refers to the traditional patterns of thoughts, activities, and views that are typically transferred from generation to generation, through direct or indirect teachings (Alcorn, 1993).

Deforestation is the gradual, enduring loss and damage of previously forested areas and tree cover resulting from continuous process of cutting down trees (forests) at a faster rate than they can grow, for agricultural or developmental purposes (Christiawan, 2018).

Disasters are described as serious disruptions in the normal operations of communities or societies which may result in extensive losses of human lives, damage to properties and the environment. These disruptions normally exceed the abilities of the affected communities to cope using their own resources (UNISDR, 2017).

Disaster Risk Reduction is a concept and practice of minimising disaster risks through systematic analysis and management of the causing factors of disasters. This can include measures like lessening exposure to hazards, reducing the vulnerability of people and properties and also the efficient management of the environment, while improving preparedness measures in the face of hazardous events (UNISDR, 2017).

Environmental degradation refers to the reduction of the environment's capacity maintain and achieve social and ecological objectives (UNISDR, 2017).

*Hazard*s refer to any dangerous events or actions that can be caused naturally or humanly-induced and have potential to cause harm, injury or loss of life or property of a vulnerable community or society (UNISDR, 2017).

Indigenous knowledge pertains to the unique cultural knowledge possessed by a community or ethnic group and often transferred from one generation to another.

Shilabukha (2015) assert that this knowledge can be carried over in various ways that may include among others, verbal knowledge transfer or practicing traditional rituals. In this study, indigenous knowledge is corresponding to the skills applied by the communities in relation to forest resources.

Livelihoods comprise of the capabilities, assets (human, physical, financial, natural and social resources) and activities needed for a means of living.

Sustainable Development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Messerli *et al.*, 2019).

Sustainable Forest Management (SFM) is the management of forests in accordance to the principles of sustainable development. This concept and practice aims to strike a balance between three key pillars namely: ecological, economic and socio-cultural.

Vulnerability refers to the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

List of abbreviations

CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resources Management
CFP	Community Forestry Programme
CDM	Clean Development Mechanism
CPB	Context Practice and Beliefs
DEES	Directorate of Extension and Engineering Services
DoF	Directorate of Forestry
DRR	Disaster Risk Reduction
FMB	Forest Management Body
GRN	Government of the Republic of Namibia
HFDRR	Hyogo Framework for Disaster Risk Reduction
IFMP	Integrated Forest Management Plan
IK	Indigenous Knowledge
IUCN	International Union for Conservation of Nature
LRDC	Law Reform and Development Commission
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism
NBC	Namibian Broadcasting Corporation
NCN	North-Central Namibia
NGOs	Non-Governmental Organisations
NPC	National Planning Commission
NTFP	Non-Timber Forest Products
OCF	Otshiku-shiIthilonde Community Forest
PRA	Participatory Rural Appraisal
SCBD	Secretariat of the Convention of Biological Diversity
SDGs	Sustainable Development Goals
SES	Socio-Ecological System
SFDRR	Sendai Framework for Disaster Risk Reduction
SFM	Sustainable Forest Management
SL	Sustainable Livelihoods
SWAPO	South West Africa People's Organisation

UNCCD United Nations Convention to Combat Desertification

UNDP United Nations Development Programme

UNISDR United Nations International Strategy for Disaster Reduction

UTA Uukwambi Traditional Authority

CHAPTER 1
Introduction and study background

1.1. Introduction

Forests around the world are among the most important economic and environmental assets, and key livelihood sources to most indigenous communities (Igwe, 2016), yet they remain at risk to internal and external shocks. Forests are one of the ecological systems faced with the ever growing challenge of unsustainable harvesting and utilisation. This unsustainable utilisation of natural resources often results in resource depletion and subsequently into environmental degradation. The Global Forest Watch (2019) reports that global deforestation was estimated at 5.69 million hectares per year by the year 2010. This is a clear indication that a huge number of trees are being lost due to natural and anthropogenic factors.

Deforestation is caused by natural or human-induced actions of cutting down of trees on an unsustainable basis, resulting in severe destruction of environmental systems and loss of valuable forested lands, often leading to environmental degradation (Olagunju, 2015; Faiza *et al.*, 2017). Deforestation is a form of environmental degradation which is common in developing countries especially in Southern Africa, due to various factors including, high poverty levels, population growth, inequitable land and resource distribution, and various unsustainable agricultural practices, as observed by (Igwe, 2016). Deforestation threatens the livelihoods of poor communities (Poufoun, 2016), particularly communities in developing countries like Namibia (Nicodemus and Hájek, 2015).

Olagunju (2015) argues that the intensification in erratic climatic conditions coupled with increased population densities may result in unsustainable land-use practices that may end up influencing deforestation. Faiza *et al.*, (2017) report the extent of impact that high population densities have on food security. When the population expands, the demand for agricultural land is also likely to increase.

Namibia may not be classified as a real forest country compared to other countries in Southern Africa, but notable forests are observed in the North-Eastern, extending to the North-Central parts of the country. Mitigating deforestation and promoting sustainable development in communal areas is a primary focus of the government of the Republic of Namibia. In 1996, the South West Africa People's Organisation (SWAPO) government

adopted the implementation of the Community-Based Natural Resources Management (CBNRM) programme. This programme is the umbrella body that embodies both the conservancy and community forestry initiatives. The conservancy and community forestry are community-based organisations that enable rural communities to have control over natural resources and guarantees the sustainable utilisation and management of natural resources for their own benefit. Prior to the enactment of the CBNRM programme, communal people had no management rights over natural resources. Community forests are entities managed by communities with the purpose of promoting sustainable forest utilisation and management. The implementation of the community forestry programme in Namibia may not guarantee an end to deforestation, but it is deemed as a useful strategy to reduce the phenomenon. Deforestation appears to be a threat towards the attainment of Sustainable Forest Management (SFM). The immediate effects of deforestation are inflicted on the normal living principles of rural communities who depend on natural resources for their well-being.

Having observed increased deforestation in the North-Central part of Namibia, there are only a few literatures pertaining to how the livelihoods and cultures of indigenous communities are affected by deforestation. Hence, the undertaking of this case study was to evaluate the impact of deforestation on the livelihoods and culture of communities living in Otshiku-shiIthilonde Community Forest (OCF).

1.2. Background of the study

Forests are one of the most valued natural systems around the world. Their importance and usage may include, but are not limited to intrinsic, cultural, economic and aesthetic values. As for their economic value, forests always prevail in the midst of their scarcity. Forests also play important ecological roles, such as helping to mitigate the effects of climate change, being home to a variety of plant and animal species (some of which are endemic or entirely adapted to live in forests), provide food and are an important source of livelihood to people around the world (Bennett, 2017). Forest resources, both woody and non-woody products are valued as primary sources of livelihood, particularly by rural communities in developing countries (Nicodemus and Hájek, 2015). Olagunju (2015) reports that forests are a major source of environmental, socio-cultural, economic and artistic benefits.

Rural communities chiefly depend on forest resources for various purposes, including health benefits, livelihoods, income and cultural values. Urech and Zaehringer (2015) note

that despite rural communities benefiting from natural resources from forests, forest ecosystems are faced with increasing losses due to unsustainable harvesting and increased agricultural practices. Forests cover about 31% of the total land of the planet and their valuable services are seemingly irreplaceable, however, they remain at great risk (Bennett, 2017). As documented in the Global Forest Watch Report (2019), 5.8% of forest cover was lost between the periods of 2010 to 2017. Leblois *et al.,* (2017) observe the expansion of agricultural fields as one of the main risk factors of deforestation.

The FAO (2018) reports that agricultural practices are among the numerous factors that account for 48% of global deforestation. Christiawan, (2018) defines deforestation as the lasting damage and change of forests to non-forests with the purpose of availing the land for other uses. The gradual change or conversion of forested areas into agricultural land and rangelands not only result in increased forest degradation and desertification, but it also threatens the livelihoods and valuable services on which the environment and rural poor communities depend on for their well-being. Wijitkosum (2016) is of the view that the unsustainable utilisation of forests and their resources may result in increased desertification, however, Chakravarty *et al.,* (2012) are of the view that desertification may also result from climatic variations. The causes and effects of deforestation may vary greatly from area to area.

Betru *et al.,* (2019) highlight the importance of effective and integrated measures that aim to promote the preservation of natural resources. The community forestry programme is a conservation and socio-economic development initiative falling under and promoting the Community-Based Natural Resources Management (CBNRM) agenda. This programme plays an integral role in promoting local forest governance and sustainable utilisation of forest resources. Nepstad (2014) reports that deforestation can be reduced by promoting the use of suitable land use practices of local communities and sustaining natural environmental settings across the globe to achieve sustainable development. Sherbinin *et al*., (2007) note that the interactions between the environment and the human population dynamics have often been systematically viewed. On this basis and in the context of forests in North-Central Namibia (NCN), this study evaluated the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest.

1.3.Description of the study area

Namibia is an upper-middle income country in the South-Western part of Africa (NPC, 2012). The country shares its western border with the Atlantic Ocean, the northern border with Angola, its eastern border with Botswana, and the southern border with South Africa. Namibia is among the driest countries in Southern Africa, characterised by variable semi-arid climatic conditions (Nicodemus and Hájek, 2015). The country experiences highly variable rainfalls that can average from 25 millimetres in the southern parts of the country, while an average of 350 millimetres can be observed in central and northern parts of the country (Kangombe, 2010; Angula, 2010). The country is demarcated into 14 administrative regions, namely: Kavango West, Kavango East, Zambezi, Kunene, Khomas, Kharas, Erongo, Hardap, Oshikoto, Oshana, Omusati, Omaheke, Otjozondjupa and Ohangwena.

The North-Central Namibia (NCN) is made up of four of the 14 administrative regions (also referred to as the 4 "O" regions) namely: Oshikoto, Oshana, Ohangwena and Omusati regions. The four "O" regions are predominated by the Aawambo ethnic group and further segregated into seven sub-ethnic groups (sub-tribes), namely: Aakwanyama, Aambandja, Aandonga, Aakolonkandhi, Aambalantu, Aangandjera, Aakwaluudhi and Aakwambi. The NCN is significant for its high population density, unlike other parts of the country. The NCN regions fall under communal land use class that cover approximately 40% of the total surface land in Namibia (Strohbach, 2010).

This study was undertaken in Otshiku-shiIthilonde Community Forest (*Figure 1.1*), situated between the Oshana and Omusati regions. The community forest falls under the jurisdiction of Uukwambi Traditional Authority (UTA). The Otshiku-shiIthilonde Community Forest (OCF) covers a total area of 109 218 hectares (ha), with a population estimation of about 3 470 inhabitants. The OCF is located approximately 70 kilometres south of Oshakati town and it is characterised by deep sandy soils, hence its name "Otshiku", meaning deep sands. The area is dominated by moderately fertile soils that are mostly suitable for crop production, although saline soils are also common in some areas of the community forest. Subsistence crop and livestock farming are one of the common farming practices undertaken in the NCN region. There are seven established villages in the OCF, led by village headmen and women of the Uukwambi Traditional Authority (UTA).

The Namibia Statistics Agency (2011) reported that a proportion of communities in Oshana and Omusati regions are formally employed in the public and private sectors. From these regions, a few depend on government social grants, income from small and medium enterprises, such as informal beverage shops and supermarkets, just to mention a few.

1.3.1. Climate

As is the case with most parts of Namibia, the climate in North-Central Namibia (NCN) is characterised as semi-arid, with hot summer months and cold winter months (Kangombe, 2010). Due to rainfall variability, the NCN receives an annual rainfall varying between 75 millimetres and 350 millimetres, especially during good rainfalls. The wet seasons normally occur from November to April each year, and dry seasons are dominant from May to October. The temperatures in the NCN also vary greatly, dominated by hot temperatures.

1.3.2. Vegetation and topography

Namibia's vegetation is determined by the amount of rainfall received. Apart from Namibia's open grassland savannahs, prominent forests are found in the north-eastern part of the country, stretching towards the north-central regions (Mendelsohn *et al.*, 2002). Curtis (2005) classifies the Oshana and Omusati regions under the mopane savannah vegetation zone, *Colophospermum mopane* (Mopane tree) the most dominant tree species in the area. The sandy-loamy soil is favourable to tree species like *Terminalia sericea*, *Terminalia prunioides* and *Commiphora spp.* These tree species are mostly used for firewood, extracted poles for construction, among other various household activities. The landscape of the NCN is largely flat, with a few hills sparsely distributed among the area.

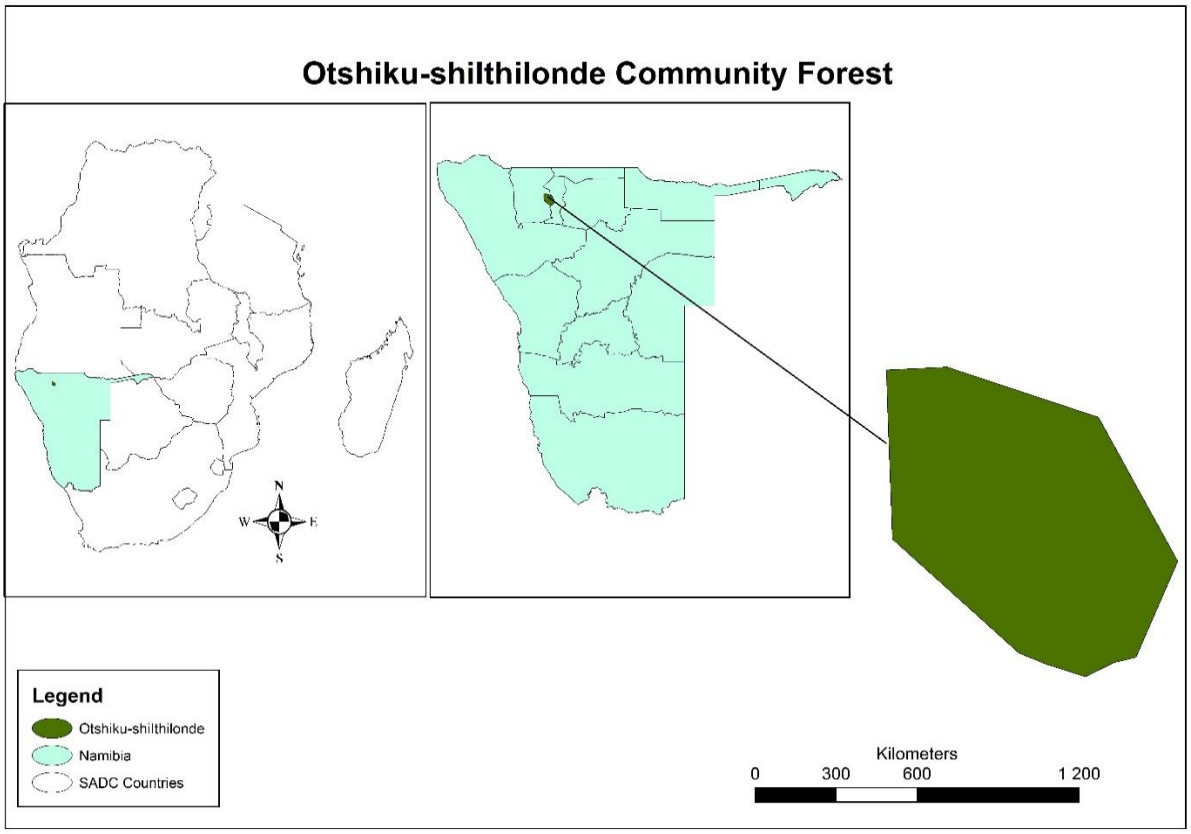

Figure 1.1: *Location and Map of Otshiku-shiIthilonde Community Forest, Namibia. (MAWF, 2019).*

1.4. Problem statement

The Global Forest Watch (2019) report that over 5.8% of forest cover has been lost globally between 2010 and 2017. The majority of forest losses experienced and changes of tree cover could be attributed to natural and anthropogenic factors. In some cases, the forest losses are exacerbated by the failure of relevant authorities to attend to primary risk factors of unsustainable natural resource utilisation and the possible indecisiveness of local communities in participating in environmental management.

The prudent management of the environment and CBNRM can contribute to the resilience of communities through sustaining livelihoods, preventing conflicts among communities and promoting good governance. People around the world, Namibia not exempted, depend on natural resources for their livelihoods (Lee *et al.*, 2009). This reliance on natural resources is especially the main livelihood source for poor rural communities (Nikodemus and Hájek, 2015). However, communities also tend to clear medium to vast areas of land in order to practice crop production and livestock farming. These subsistence agricultural practices are classified among the multiple livelihood sources of communal communities.

The continuous conversion of the natural land into crop fields, rangelands and establishing settlements represent one of the most visible and predominant impact of humans on the environment.

Over the past years till present, it is becoming increasingly evident that human actions can positively or adversely have an effect on global natural environments. Establishments have been made on the likelihood of human actions resulting in major environmental changes. In light of this, forests are faced with increasing pressures mostly applied by humans. Rural people clear large portions of forests for various practices, including but not limited to agriculture and establishment of settlements. Pressure is also exerted by humans through unsustainably accessing natural resources for livelihood purposes. Livelihoods are comprised of abilities and assets (e.g. physical, financial, human, natural) possessed by a community and regarded as the basic needs for a means of living (UNISDR, 2017).

A livelihood is sustainable when it can survive internal and external shocks, while retaining the ability to recover from those shocks and maintain or improve both their capacities and assets in the present and future, without undermining the natural resource base (UNISDR, 2017). Deforestation and over-dependence of rural communities on natural resources are one of the increasing environmental factors and challenges faced by Namibia's degraded environments (Nikodemus and Hájek, 2015). These challenges may potentially undermine the well-being of communities, especially of poor people who predominantly rely on natural resources for their livelihoods. The implementation of the CBNRM programme in several countries across the globe, including Namibia, is perceived as a great initiative that jointly involves local communities in sustainably utilising and managing natural resources.

However, literature (Deininger and Minten, 2002; Robinson *et al.*, 2011; Nicodemus and Hájek, 2015) does not exclusively point out the effect of deforestation on livelihoods and culture of indigenous communities. Hence, this research aimed to evaluate the impacts of deforestation on the livelihood and culture of communities in Otshiku-shiIthilonde Community Forest, situated in the north-central part of Namibia.

1.5. Study aim and objectives

The primary aim of this study was to evaluate the impact of deforestation on the livelihoods and culture of communities within Otshiku-shiIthilonde Community Forest.
In order to achieve the overall objective of this study, the following were to be achieved:

- To determine the main livelihoods and their importance to communities in Otshiku-shiIthilonde Community Forest (OCF);
- To assess the importance of the forest to the local communities in OCF;
- To identify indigenous and local activities that have an impact on the forest;
- To evaluate the impact of deforestation on the livelihood and culture of communities in OCF; and
- To make possible recommendations for wise and sustainable forest management.

1.6. Research questions

In order to achieve the objectives of this study, the following questions were to be answered:

- What are the livelihood sources and their importance to communities in Otshiku-shiIthilonde Community Forest (OCF)?
- How important are forests to the local communities in OCF?
- What indigenous or cultural activities have an impact on the forest?
- How does deforestation impact the livelihood and culture of communities in OCF?
- What possible ways or measures can be recommended for sustainable forest management?

1.7. Significance of the study

This is an interdisciplinary study, incorporating both social and natural dimensions. The evaluation of the impact of deforestation on the livelihood and culture of indigenous communities is not only important to people who directly benefit from the goods and services provided by the forest in the community forest. It is also significant in determining the effect of community forestry programme in reducing environmental and climate-related disaster risks. This study is unique because prior to this, no similar study has ever been conducted in Namibia on the effects of deforestation on the livelihoods and cultures of local communities in the north-central part of the country.

The study explored the challenges encountered by indigenous/local communities as a result of deforestation, with a further analysis of how the community forestry programme as a counteractive measure assists in sustainable forest management, as well as maintaining the well-being of rural communities. A study of this nature is relevant to the fields of disaster risk management and disaster risk reduction because it provides an analysis on the interactions between humans and nature (community forests), a case study of Otshiku-

shiIthilonde Community Forest. The study also attempted to attend to sustainable environmental management in the sense that the community forest in which the study was conducted is among the manifold CBNRM strategies. These strategies were implemented to reduce forest deterioration, while contributing to social welfare through ensuring that rural people benefit from the goods and services provided by the forest. The researcher established a strong understanding of the ecosystem-based disaster risk reduction dimension which guided the process of this study.

This study presents the case of Otshiku-shiIthilonde Community Forest. It highlights the sources of livelihoods and their importance to the local communities; gives an analysis of the factors of deforestation in the community forest; and points out the local strategies undertaken to reduce deforestation and ensure the realization of sustainable forest management. Through this, the researcher aimed to answer the study's key question: how does deforestation impact the livelihood and culture of communities in Otshiku-shiIthilonde Community Forest?

Answering this question was crucial as it would inform the local communities, local government and policy-makers on the potential short-term and long-term effects that are caused by deforestation on indigenous communities, in the face of community-based sustainable forest management programmes. For Namibia, this study is the first of its kind intending to fill the knowledge gap of identifying how local livelihoods and culture of indigenous communities are impacted upon by deforestation. For OCF, the study helped to clearly define the factors of deforestation in the community forest. It also contributed to the exploration of ways that can be replicated to address the issue of uncontrolled forest harvesting and mitigate forest degradation. The detailed methodology on how the study was undertaken is presented in Chapter 4 of this research.

This study was worth undertaking because it will not only contribute to existing literature on the dynamics of deforestation, but it will also contribute to long-term strategies of sustainable forest management. This reduces the vulnerabilities of local communal communities who depend on natural resources for their well-being.

1.8. Delimitations

Namibia is a large country, and the CBNRM programme is rolled out in most communal areas of the country. Due to financial constraint and the limited timeframe, this study could not be expanded to the villages outside the community forest. The strict delimitation of the

study to be conducted within Otshiku-shiIthilonde Community Forest allowed the researcher to be more specific and also enabled the study to be measurable, compared to a general study.

1.9. Chapter summary

This chapter comprised of the introduction and background of the study. It covered various aspects that led to the undertaking of this study, including the research problem, the research objectives and research questions, and why the study is of relevance and necessitated its undertaking. The following chapter provides the blueprint, the theoretical and legislative frameworks underpinning the study on evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest.

CHAPTER 2
Theoretical and Legislative Framework

2.1. Introduction

The previous chapter provided the point of departure of this study by presenting a brief introduction and background of the study. The problem statement, research objectives, research questions and significance of the study were highlighted. This chapter presents the theoretical and legislative frameworks of the study. Grant and Osanloo (2014) highlight the importance of theoretical frameworks in scientific studies, asserting that they form the blueprint of a study by establishing the theoretic structure and informed guideline of the study. The research frameworks provide a set of concepts, assumptions, practices and values that constitute the way of viewing a specific reality (Ostrom, 2009). Furthermore, theoretical frameworks provide common sets of variables that are used to guide and design data collection tools, directing the fieldwork process and data analysis (Ostrom, 2009).

This chapter discusses and presents the frameworks adopted in this study on the basis of reviewed literature and existing theories that have been tested and validated by scholars. The chapter is divided into two sections, the first section deliberates on the study's theoretic models in the form of the socio-ecological system and the neo-structuralism model, while the second section outlines the legislative arrangements relevant to the study and closely aligned to environmental and disaster management in Namibia.

2.2. Theoretical framework for forest system

The theoretical framework and the models applied served as lenses for an overview of practices and ideas that shaped the way this research sought to evaluate the impact of deforestation on the livelihood and culture of communities in Otshiku-shiIthilonde Community Forest. In essence, there are numerous factors that may contribute to deforestation, human activities or on natural factors. Both these set factors have negative impacts on the environment including forests, and thus resultantly exacerbates the impacts of deforestation on the environment and communal communities. Deforestation results in imbalanced natural systems (Karkee, 2007). Such imbalances can limit the optimal capacity of resource systems to provide vital goods and services. However, through remedial measures, among others, the application of indigenous knowledge or

complementing it with scientific knowledge can be effective in managing local-based resources.

This section presents the theoretical foundation of the study, supported by relevant literature on the interaction between natural and human systems. It further explores the relationship between local communities and the use of indigenous knowledge in sustainable forest management.

2.2.1. The socio-ecological system

There are no social systems without nature, and there are no ecological systems that do not comprise of people (Petrosillo *et al.*, 2015). The systems consisting of social, ecological, economic, cultural, political and other elements are widely identified as socio-ecological systems (Petrosillo *et al.*, 2015). Ecosystems are partly socially constructed, whereas the management of resources and conservation of indigenous systems is based on the diversity of social progressions (Shilabukha, 2015). Primarily developed by Ostrom (2009), the Socio-Ecological Systems (SES) model assists researchers to better understand the complex relationships and interactions in SES. Ostrom (2009) identified three key challenges that led to the development of the SES. These include the global potential loss of resource systems (including forests); inadequate understanding about processes that can lead to improvement or deterioration of natural resources; and the different variables that enable one to determine outcomes in socio-ecological systems (Ostrom, 2009).

The SES is a preferred model for well-defined domains of common-pool resource management situations, where resource actors (resource users) rely on resource systems (McGinnis and Ostrom, 2014) and various benefits important for their livelihoods. A livelihood comprises of assets (physical, human, natural, financial and social capitals), and the ability of having access to institutions and social relationships. All these features and their combined availability may determine the type of living obtained individually or collectively. The overall concept of the SES revolves around mainstreamed research fields, with a focus on relations and interactions between social settings and environmental systems. Partelow (2018) notes that, resulting interactions between humans and the environment may possibly influence or obstruct the attainment of sustainability in ecosystems. This essentially depends on the way people use natural resources and the consequences that the resource actors have on natural systems.

The SES is comprised of independent and interrelated social and ecological elements that influence the outcomes of resource systems. Zhao and Wen (2012); Hinkel *et al.*, (2014) emphasise that, the SES is a two-way interaction model between humans (socio-economic systems) and their surrounding environments (natural systems). The system is vital for specific resource-use sectors, especially those with common-pool resources, such as the water, fisheries and forestry sectors (Partelow, 2018).

The applied theory reveals that there are no independent social systems that do not interact with nature, and similarly there are no natural systems that do not rely on interactions with humans. The epistemology (knowing more of the reality) of the SES model puts the interaction between people and nature at the centre of analysis. In context of this study, the SES model assisted the researcher to examine and understand the interactions between the natural forest system and rural communities, and how their individual or collective collaborations may influence decision-making processes in the presence of resource governance systems (Partelow, 2018).

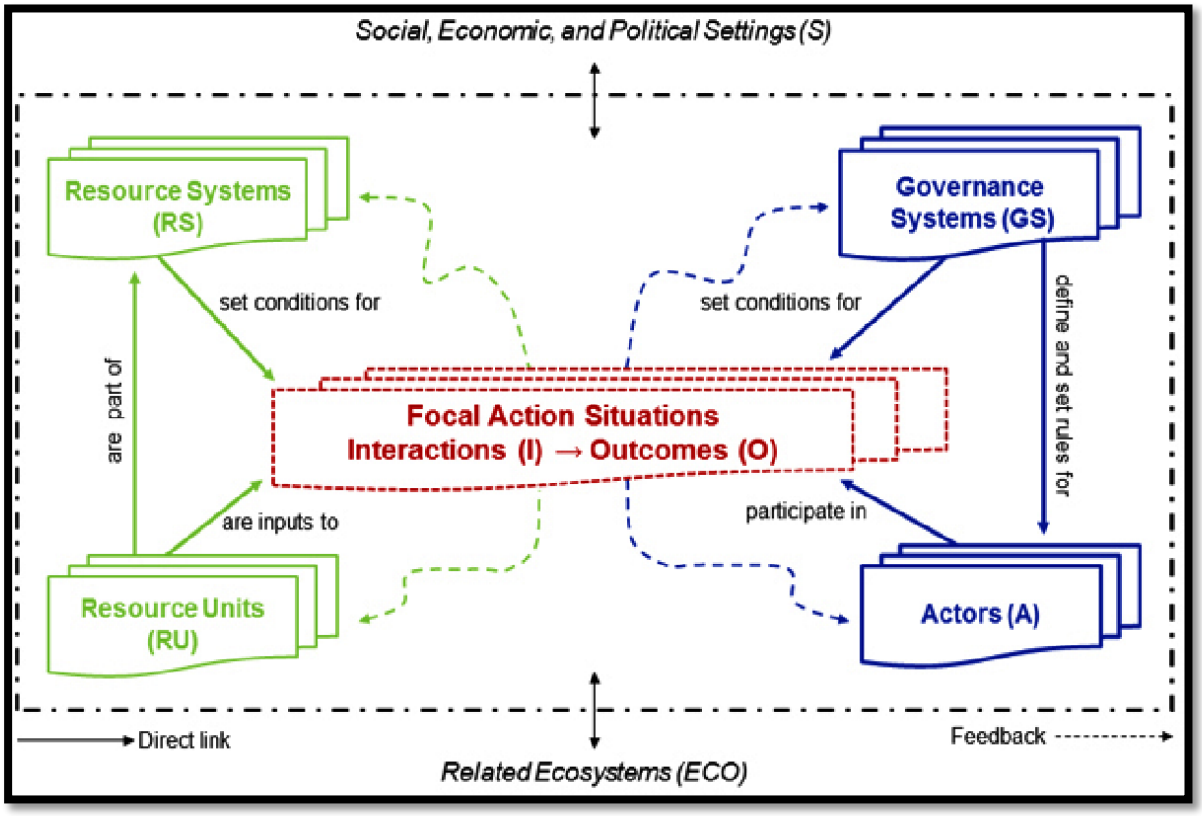

Figure 2.1: *The Socio-ecological system (McGinnis and Ostrom, 2014).*

The SES model comprises of different independent variables/elements, recognized in two tiers (Partelow, 2018). The first tier variables include resource systems, resource units,

resource users and interrelated ecological systems, social, economic and political settings. The second tier variables are the explanatory factors for the first tier category variables (McGinnis and Ostrom, 2014; Partelow, 2018). These variables are essential to the interactions between social systems and the environment, resulting in socio-ecological outcomes (Partelow, 2018), such as deforestation.

In context, resource systems (forestry), resource units (woody and non-woody products), users/actors (individuals and local communities) and the governance systems (community forestry programmes) are relatively separable. However, their interactions result in valuable outcomes (Ostrom, 2009) to the equal benefit of the environment and communities.

The main variables of the SES model are presented below and discussed how they are applicable to this study:

(a) Resource systems

Resource systems are conceptualised ecosystems from a human-use outlook (Ostrom, 2009). Hinkel *et al.*, (2014) explain that resource systems can be determined by the physical and technical processes that contribute to the production of resource units.

Forest resource systems include a variety of resources that benefit local communities through the range of goods and services they provide. Resource systems services vary greatly, from intangible features (regulatory services) to tangible resources, such as land, wood, edible fruits and medicinal products (leaves, roots, fruits) that are of utmost importance to the well-being of communal people and their livelihoods. In essence, resource system characteristics like the size and boundaries of the resource system, mobility of resource units, and the benefits derived from resource system are prominent features that are relevant in determining the effectiveness of resource governance (Agrawal, 2007).

In North-Central Namibia, forests are regarded as important natural assets, especially to the locally applied farming systems. These natural assets play a key role in the livelihoods of rural communities. However, Ostrom (2009) argues that natural resource systems like forests normally have large territories that can make it difficult and less-likely for communities to be self-organized. This may be due to high costs that are incurred in defining boundaries and patterns used for monitoring and acquiring ecological knowledge. Besides the uncommon small territories of resource systems, moderate territorial resource

systems in the form of defined community forest areas may create conducive environments for the realisation and efficient community self-organisation. To that extent, the productivity of resource systems (forests) can have a positive impact on self-organisation of individuals or communities (Ostrom, 2009). For example, when forests, which are important livelihood sources, are exhausted through over harvesting or contrarily, the resource units are in abundance, resource users/actors can be forced to prioritise the urgent need of sustainably utilising and managing the resource systems. In most instances, resource users have the ability to observe scarcity of a resource before taking action to invest in remedial and self-organisation measures.

Local communities derive goods such as wood for energy and tree logs for local construction purposes at household level. Forests also provide a variety of food products that have pharmaceutical value, such as leaves, roots, and wild fruits. Predicting the dynamics in resource systems can be vital to resource users/actors to estimate what could happen if they are to develop rules on harvesting and accessing certain territories of resource systems (Ostrom, 2009). Forest systems are predictable, compared to other resource systems such as marine systems, in terms of monitoring physical deterioration and gradual degradation. Apart from depending on forests, rural communities have alternative livelihood sources like formal and informal employment opportunities that help sustain themselves and maintain their livelihoods.

(b) Resource units

Forest systems remain relevant sources of goods and services. These systems are not only essential for the maintenance of ecosystems, but are also valued for the contributions they make towards the livelihoods of native communities (Karkee, 2007). Resource units, in this case, woody and non-woody forest resources, are valuable in contributing to the livelihoods of communities in their economic value and usefulness at household level. Apart from resource units gained from forests, local communities may also possess alternative resources that may include modern infrastructures, equipment and tools used to effectively and efficiently pursue their livelihood outcomes.

Forests provide vital goods (resource units) and services for the well-being of humans and natural capital. For example, forests provide resource units, such as firewood, construction poles and services like regulating local temperatures. However, Ostrom (2009) reported that managing fixed resource units such as trees is better, in the sense that it can improve

self-organisation among communities, compared to mobile resource units like wildlife or riverine water systems. This conforms well to the community forestry programme, which among other strategies, is implemented to safeguard natural forest resources and ensure that communities sustainably benefit from the natural resources.

(c) Resource Users/Actors

Resource users/actors in this context refer to individuals or communities who, on a regular basis rely on resource units (forest products) from the resource systems (McGinnis and Ostrom, 2014). It is important to have a comprehensive understanding of the underlying driving forces that influence or contribute to changes on ecological systems (Petrosillo *et al.*, 2015). The origins and driving forces of deforestation are manifold, but can include political, socio-cultural, economic and legislative structures. As a result, these changes adversely affect or reduce the ability of natural systems to continue replenishing the essential goods and services to resource actors (humans). However, resource users are able to make provisions and undertake necessary measures to maintain resource systems, in accordance to the rules and procedures determined by the overarching governance systems and based on the context of related ecological systems (McGinnis and Ostrom, 2014).

Despite the notion that humans are the main factors contributing towards the decrease of forest ecosystems, floods, wild fires, etc. Earthquakes are also notable factors that may contribute to environmental degradation. For example, fires may destroy key forest resources (woody and non-woody), ultimately reducing the financial or economic gains from forests, while at the same time threaten biodiversity with extinction through habitat fragmentation.

The number of resource users and their organisation level is able to determine the amount of pressure exerted on resource systems. This could mean that the more the number of people who depend on forest resource units increases, the higher the pressure exerted on the resource systems (forests). Similarly, if the people in the resource system are not well-organised to sustainably manage the resources, it may be a costly task of bringing people together for decision-making and agreeing on proposed programmes. In the case where the task of managing and monitoring resource systems, such as community forests becomes costly, collective efforts can be an effective mechanism to mobilise resources and labour force to tackle the challenges (Gibson *et al.*, 2000).

Resource users with common ethical and moral standards (cultural similarity) on how to behave as individuals or groups enhance social cohesion (connectivity) and thus, can be decisive factors in making decisions and monitoring the resources (Baland and Platteau, 2000; Ostrom, 2009). This is similar to instances where local communities share common knowledge about resource systems, common resource pools and the interactions that occur between them. Local-based knowledge, also referred to as indigenous knowledge complemented with scientific knowledge can be consolidated to help local communities understand and manage the dynamics of forest resource systems. This can be effective in preventing the over-utilisation of forest resource units. For example, forest resource systems regenerate at a slower pace as the human population increases. Thus, it is imperative for communities to be aware of the carrying capacity of the forest system, in the sense that they organise themselves to prevent forest degradation and deforestation.

Among the manifold consequences of deforestation on the environment, it risks the livelihoods of vulnerable communities, and has a negative impact on local and global climates. Deforestation is a threat to local farmers, especially to those who depend on subsistence agricultural practices for their livelihoods, and presents a continuous threat towards biodiversity (Chakravarty *et al.*, 2012). The disruption of local livelihood strategies can result in temporary or permanent displacement of communities from their indigenous lands. Barraclough and Ghimire (1995) noted that rural communities are left displaced when their forest-depended livelihoods are disrupted. Most often, it is the poor people who are negatively affected due to their limited or lack of alternative livelihood sources. They are then forced to dispose of their land (natural system) as a coping strategy due to their reduced productivity. This issue can contribute to manifold existing social problems and extensive unsustainable utilisation of forest systems.

(d) Governance systems

Governance systems are processes and institutions that are capable of shaping and influencing the behaviour of resource users or actors (McGinnis and Ostrom, 2014). This may comprise existing legal structures which lay the foundation of setting rules and conditions on resource utilisation and management of natural systems like forests. The socio-ecological system can be used to determine comprehensive management perspectives through ecological and socio-economic processes (Zhao and Wen 2012), informed by governance systems in place. Partelow *et al.*, (2019) consider using the SES model as a tool for understanding the relationship between humans and nature. The SES model is also

suitable for knowledge-exchange in community-led management systems. McGinnis and Ostrom (2014) agree that the system is fundamental in informing human-decisions, individually or collectively, to better manage natural systems.

Perceived as a resource management strategy that involves active participation of local communities, Namibia has so far gazetted 42 community forests in communal areas across the country. This programme is also perceived as a local governance system that is appropriate in addressing various socio-economic and environmental issues like deforestation (Karkee, 2007). The community forestry programme enables local communities to benefit through the sustainable utilisation of natural resources, ultimately having an impact on alleviating poverty among rural communities. The relevant environmental management legislations for resource management in Namibia are discussed in section two of this chapter.

On the question raised by Woodley (2002) as to how indigenous knowledge contributes to ensuring that environmental integrity is maintained? This study preserved the notion that the community forestry programme, together with applied indigenous/cultural knowledge can have a positive influence towards sustainable natural resource utilisation and management.

(e) Interactions and outcomes

Past and present social patterns like population densities, migration patterns, developmental programmes and political stability can have an influence on the health and state of natural systems (Barraclough and Ghimire, 1995). Belle *et al.,* (2017) note that most ecological problems, e.g. wetland degradation and deforestation, among others, are a result of deep-rooted societal problems that are driven or influenced by different forces, categorised as underlying or immediate causal factors. Most often, the underlying factors are linked to economic, policies, institutional, technological, cultural and demographic (Plugge *et al.*, 2014). McGinnis and Ostrom (2014) identify the extraction and maintenance of natural processes as important forms of interactions and outcomes that are at the centre stage of the SES.

The primary impact of unsustainably extracting forest resources (deforestation) leads to serious disruptions in services and a reduction of goods that forests provide to the local communities. Bethel (2016) argues that deforestation has more severe effects on women than on men. This resonates with the findings of a case study that looked at the effects of

deforestation on indigenous communities in Panama, Honduras and Costa Rica, reporting that women and children are worst affected by deforestation, compared to men (Barraclough and Ghimire, 1995). This is due to the fact that most household activities are entrusted to women to conduct, with assistance from their children. For instance, Bethel (2016) notes that the reduced availability of fuel wood, medicinal plants and fodder from forests puts increased pressure and work-load on women. Men migrate from degraded areas to other areas in search of improved rangelands and fertile lands for crop production and livestock grazing. Women are required to walk long distances in order for them to access forest resources (Bosu *et al.*, 2010), especially when surrounding resource systems are depleted.

The SES model acknowledges that humans have a negative effect on environments through their actions. Majority of the challenges faced by natural systems like forests are a result of complex interactions between diverse shocks that require different management approaches of various magnitudes (Fischer, 2018). The sustainability of the SES model primarily depends on resource users or on government structures that can develop rules and regulations on resource utilisation and management (McGinnis and Ostrom, 2014). In addition, the perceptions of resource actors/users on other users and on government programmes can have an effect on the participation, communication and knowledge exchange among communities. This can ultimately lead to improved outcomes to the benefit of both humans and the environment (Partelow *et al.*, 2019). Therefore, ensuring the sustainability of both natural systems (forests) and social well-being would require active participation of various actors and constructive deliberations among them. Janssen (2002) argues that long-term sustainability may not be achieved if rules that were initially set by resource actors (communities) or by the government are not consistent or corresponding to the local conditions of the environment. Gibson *et al.*, (2000) recommend that the long-term sustainability of resource systems like forests can only be ensured if there is a correspondence between the characteristic values of resource units (forest resources) and the needs of resource actors. However, these rules often may not be adequate over extended periods of utilising natural resources (Dietz *et al.*, 2003).

2.2.2. The Neo-structuralism system

Understanding the dynamics of the natural system necessitates a progressive cultural analysis of indigenous communities, with a background of their past and present

interactions with the environment. The applied neo-structuralism system seeks to explore and acquire an in-depth understanding of the relationship between natural and human systems, through integrating social characteristics with progressive natural systems. The system is comprised of three independent elements, namely: context, practice and belief (Shilabukha, 2015). The interaction between context, practice and belief sub-systems develops a cognised model for natural systems like forests. The ultimate outcome of interactions between nature and human cultural dynamics involving indigenous knowledge can result in modified structural systems (Shilabukha, 2015). Researchers have recognised the importance of indigenous people in managing natural resources and the environment they live in without significant damages on the local ecological systems.

The neo-structuralism system reveals the importance of cultural and indigenous knowledge in understanding various environmental aspects and natural systems. Woodley (2002) is of the view that socio-ecological conditions of natural systems are framed in the context, practice and beliefs (CPB) complex, onto which ecological knowledge is embedded. The CPB model acts as the centre point for the complex system that emerges from the reciprocal interactions. This takes into consideration the setting of the area, previously encountered events, and the belief systems in place, all which provide the strong basis of understanding the interactions between humans and ecosystems (Woodley, 2002). The usefulness of the CPB model is embedded in the epistemology of local knowledge management systems that intend to broaden the understanding of ecosystem variables, and have an influence on constructing/acquiring the needed knowledge (Woodley, 2002).

Bendsen and Motsholapheko, (2003); Shilabukha (2015) note that the Context-Practice-Belief model is a vital model in resource analysis and decision-making. It can also be useful in interpreting and understanding social-ecological interactions in a better way. As applied by Woodley (2002), the context sub-system captures in detail, the historical context and geographical location of the community and their interactions with the natural systems in which they live in. The practice element consists of cultural diversity and environmental knowledge possessed and applied by indigenous communities towards the environmental systems. This takes into cognisance the fact that various communities have different cultural beliefs and norms towards the environment they live in. However, the belief sub-system of the CPB model brings to the fore-front the challenges that are encountered in merging indigenous knowledge with scientific knowledge (Woodley, 2002). The sub-

system also takes into consideration other elements and variables that can equally or devastatingly have an effect on the cognised model.

The key components of the cognised model are presented, discussed and applied as follows:

(a) Context - Kuper (2014) reports that the neo-structuralism model is valuable in defining structures within traditions or cultural norms of communities, thus linking local cultural experiences with their surrounding environments. Shilabukha (2015) is of the view that the extent to which the environment is exploited is largely influenced by societal behaviours, often through the benefits that local people derive from specific environments. Indigenous management systems and practices, including the use of indigenous knowledge, is conceptualised in the complex CPB model (*Figure 2.2*). The model further demonstrates how different independent variables or key sub-systems may influence the development and use of indigenous knowledge of local communities on forest use and management. Characteristically, the CPB complex promotes a hybrid approach that could be suitable in assisting with planning and decision-making processes. This is a participatory concept in the sense that it actively involves local communities in managing natural resources. Thus, it can be recognised as a key mechanism for both alleviating poverty and protecting the environment for sustainability (Bendsen and Motsholapheko, 2003).

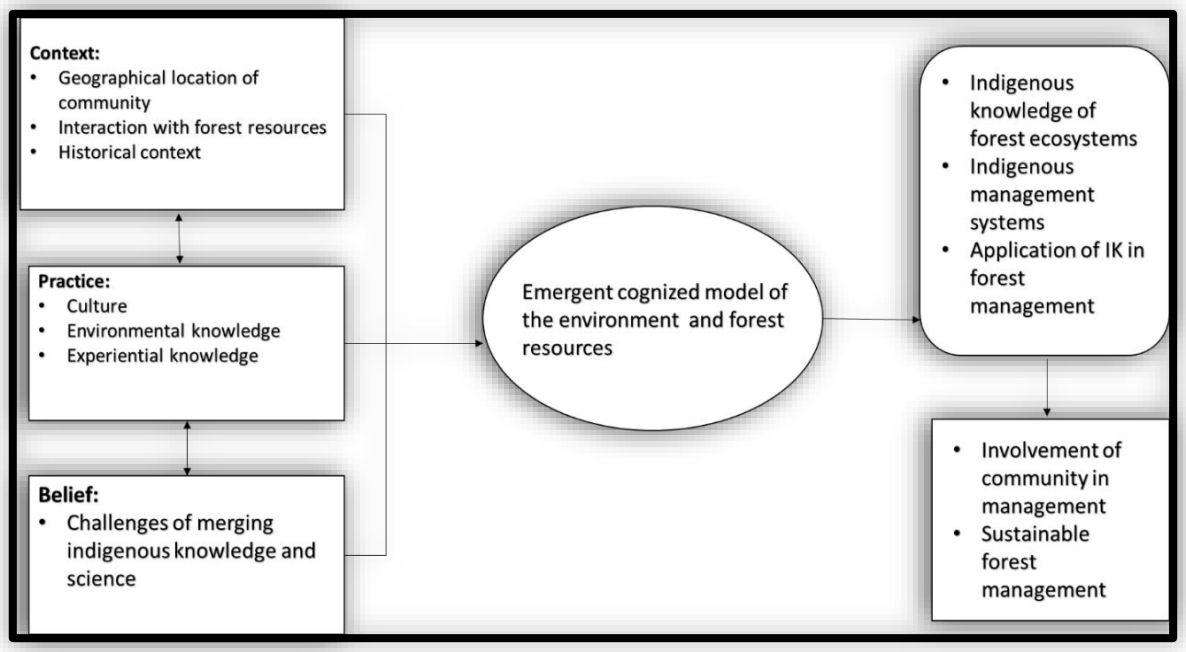

Figure 2.2: *The Context-Practice-Belief model (Woodley, 2002)*

(b) Practice – This sub-system includes various resource management systems, including social institutions that are in place and can be applied to understand the dynamics of ecological processes (Woodley, 2002). This element of the CPB includes sub-systems such as the cultural norms and practices of communities, the variety of indigenous knowledge and empirical knowledge possessed that may negatively or positively influence environmental management. The cultural norms and practices of communities are tied to the survival of ecological systems, in this stance forests (Shilabukha, 2015).

(c) Belief – The belief component of the CPB complex entails the widespread perspective which is vital in shaping observations and perceptions on the environment (Woodley, 2002). This sub-system may also be useful to communal communities that may have various management strategies in place, supported by social-environmental institutions, like the Community Forestry Programme. Literature reveals that the application of indigenous knowledge can be useful on which comprehensive or alternative measures of managing natural resources can be developed (Tanyanyiwa and Chikwanha, 2011). One of the advantages why indigenous knowledge is sometimes preferable over scientific knowledge is the fact that local people make use of locally accessible and cost-effective skills, other than that associated with science-based knowledge. However, the belief element of the system acknowledges that challenges are encountered, especially when trying to integrate indigenous knowledge with science in managing natural resources.

(d) Emergent cognised system - The cognised model of the system is a representation of a stream of knowledge with regards to the interactions between humans and forest ecosystems (Woodley, 2002). This cognised model is a result of interactions between the elements as listed in the sub-systems of the Context, Practice and Belief (CPB). Changes caused in the structural organisation of the system's components may have an effect on the cognitive patterns of the system. This may result in effects on indigenous knowledge and the interactions within the forest system.

(e) System outcomes - Indigenous knowledge (IK), also referred to as cultural-possessed knowledge, include social, political, spiritual, intellectual and economic elements (Tanyanyiwa and Chikwanha, 2011). This knowledge may also determine the outputs

of natural systems in terms of the goods and services they provide to local people. Partelow *et al.*, (2019) highlight the importance of knowledge exchange and communication enhanced by communication among resource users, e.g. forest users, through social learning processes. Social learning is regarded as an essential process for human development and further enhances cooperation among communities (Dietz, 2013). The historical nature of IK is embedded in its dynamic and continuously changing knowledge element, that enable people to adapt or influence changes on socio-ecological systems (Woodley, 2002). IK is applied on the basis of different categories and interests that appear to be common in rural settings. This may include, but not limited to agriculture, pastoralism, agroforestry practices and water resource management.

The adoption and implementation of the Community-Based Natural Resource Management (CBNRM) programme in most communal areas of Namibia, such as the community forestry approach can be viewed as a mechanism intended to promote the sustainable utilisation and management of forest-based resources. The initiative involves the active participation of local communities in sustainably utilising, benefiting and managing natural resources. Overall, the initiative also promotes resource ownership and enhances local governance. Therefore, such socio-ecological settings are commended for their accommodating ability of integrating both indigenous knowledge with scientific methodologies to manage natural resources. Tanyanyiwa and Chikwanha (2011) are of the view that indigenous communities are more familiarised with their surrounding environment. In this context, the knowledge that is applied by indigenous communities towards the environmental systems form the primary base on which the society may develop effective measures to manage forestry resources.

2.3. Disaster management cycle

A disaster is described as a serious disruption in the normal functioning of a community. This involves various impacts and loss of human lives, economic losses, infrastructural and environmental damage, normally exceeding the ability of the affected community to cope using their own resources (UNISDR, 2017). Disasters occur when communities, environments or properties become exposed to or are vulnerable to hazards. Thus, disaster management is the systematic approach of identifying and managing the causes and impacts of a disaster on a community or environment. This is done by applying the

necessary measures and mechanisms aimed at minimising possible future occurrences of such disaster risk and its possible impact. The Hyogo Framework for Disaster Risk Reduction (HFDRR) and its successor, the Sendai Framework for Disaster Risk Reduction (SFDRR) advocate for a shift from reactive to proactive management of disaster risks. Deforestation is an environmental hazard that can increase disaster risks and vulnerability of local communities to hazards like floods, extreme droughts and climate change effects.

The disaster management cycle is viewed in two perspectives (phases), namely: the pre-disaster risk reduction phase and post-disaster recovery phase. In this context, the pre-disaster risk reduction phase is focused on implementing strategies and practices intended to analyse and manage causal factors of extreme events, managing vulnerabilities and reducing exposure of communities, assets and the environment to hazards. Its effective implementation can also be integral in promoting resilience to a variety of shocks. This may include the preservation (conservation) or restoring essential structures and functions of natural systems.

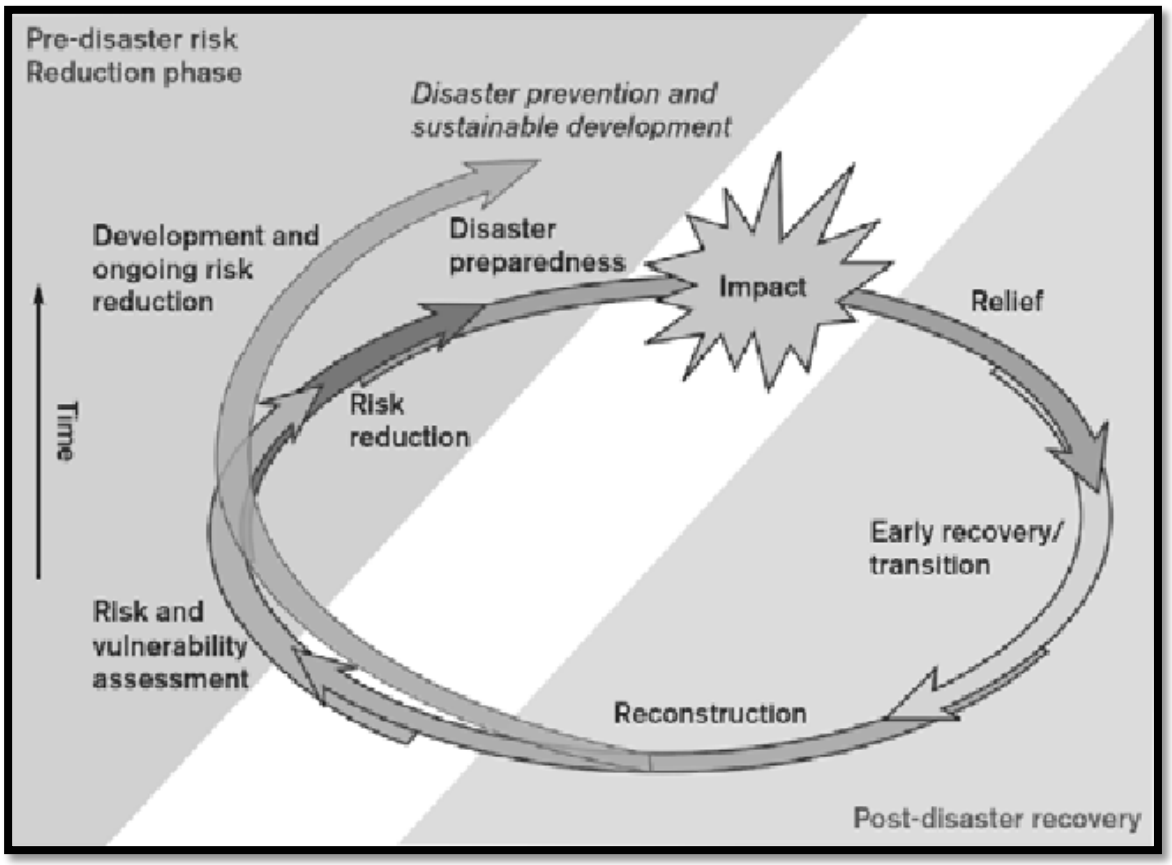

Figure 2.3: *The Disaster Management Cycle (RICS, 2009).*

2.3.1. Pre-disaster risk reduction phase

a) Prevention and Mitigation

Mitigation in disaster management entails practical activities aimed at lessening or reducing negative impacts of hazardous events (UNISDR, 2017). It is imperative to note that most hazards, particularly natural hazards, cannot be fully avoided or prevented, but their impacts can be substantially mitigated by implementing strategic and systematic measures to reduce their effects. These measures may include, but not limited to, setting up operational early warning systems, implementing integrated land use planning and management, public education and awareness campaigns and conducting risk assessments and vulnerability analysis.

In the context of this study, the pre-disaster risk reduction element is possibly mainstreamed into national and local development policies, such as through implementation of the Community Forestry Programme. The community forestry concept is one of the measures undertaken by the government of the Republic of Namibia, to curb forest degradation, while simultaneously promoting poverty alleviation among local communities. In essence, the programme promotes the sustainable utilisation of natural resources at the local level, in the sense that communal communities are the actual users and beneficiaries of the resource system. Community forestry may also make a meaningful contribution towards mitigating actual and long-term forest degradation which are important carbon sinks, and hence mitigating consequent impacts of climate change. Majority of communal inhabitants depend on crop and livestock farming, two farming and livelihood sources that are largely vulnerable to climate risks such as floods and droughts. Thus, preserving forests could play a remarkable role in curbing climate risks and limit associated hazards.

2.4. Legislative Framework

2.4.1. The Sendai Framework for Disaster Risk Reduction (2015-2030)

The Sendai Framework for Disaster Risk Reduction (2015-2030) is the international successor instrument of the Hyogo Framework for Action (2005–2015). The Sendai Framework for Disaster Risk Reduction (SFDRR) essentially advocates for shifting from reactive to proactive measures in responding to and ultimately reducing disaster risks. The framework is guided by key principles like that of preventing new risks, reducing existing risks, and enhancing resilience to achieve sustainable development. Under the renewed

framework, countries/states across the world re-affirmed their stance on addressing disaster risks and improving communities' resilience to hazards. Hence, Faiza *et al.,* (2017) highlight that the modern tendency of shaping policies on natural resource utilisation have a positive impact on striking a balance between environmental protection and sustainable development.

From the four key priorities of the SFDRR, the second priority is found to be of relevance to this study. This priority emphasises the importance of encouraging the development of mechanisms that would ensure a high level of compliance with existing laws and regulations, including those addressing land use, environmental and resource management (UNISDR, 2015). The SFDRR further identifies the importance of empowering local authorities to work and coordinate with local communities and indigenous people in disaster management at the local level. In addition, the third priority of the SFDRR identifies the significance of investing in disaster risk reduction for resilience.

The Government of the Republic of Namibia strongly supports the implementation of policies that are aimed at the sustainable management and preservation of natural resources to prevent environmental degradation and ensure sustainable development. The CFP is viewed as a key intervention, involving active participation of communities in sustainably utilising and managing natural resources. Forest ecosystems are not only fundamental in maintaining livelihoods and healthy environments, but may also be integral to manage other consequent risks associated with deforestation, such as floods. Community forests, with the knowledge of indigenous people, are vital investments for enhancing local level natural resource management. This strengthens disaster risk governance and subsequently increases the resilience of rural communities towards external shocks and hazards.

2.4.2. Namibian Constitution

A number of countries around the world have adopted various laws and policies that aim to govern and regulate the use of natural resources, Namibia is not an exception. Article 95 (*l*) of the Namibian Constitution give the government of the Republic of Namibia the mandate to maintain and promote the welfare of the Namibian people by adopting, *inter alia*, policies that are aimed at:

"Maintaining the ecosystems, essential ecological process and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future…" (GRN, 1990: 46)

This constitutional provision has created an enabling environment that led to the promulgation of innovative policies, laws and frameworks that are geared towards mitigating and adapting to the on-going environmental challenges that the country is experiencing. These challenges are serious threats to ecological systems and not only undermine the livelihoods of the vast majority of poor rural communities, but also affects the entire extended populations. The Community Based Natural Resource Management (CBNRM) programme was adopted in Namibia on the basis of global environmental management and biodiversity protection. This programme aims to decentralise powers to local communities for better enhanced management and governance of natural resources and the attainment of sustainable development. This hybrid system makes use of both modern (scientific) knowledge and indigenous knowledge at the same time (Bendsen and Motsholapheko, 2003).

Community forests and conservancies are key strategies that were adopted and currently being implemented to attend to various conservation and social issues. The concept promotes local level conservation, subsequently reducing poverty levels among communal communities through economic gains, and also empowering vulnerable communities.
Presented below are environmental legislations currently being implemented in the country and are of relevance to this study.

2.4.2.1 Namibia's Environmental Management Act No. 7 of 2007

The Environmental Management Act No.7 of 2007 was gazetted by the Parliament of the Republic of Namibia to promote sustainable environmental management. The Environmental Act aims to promote sustainable environmental management and utilisation of natural resources by establishing principles for decision-making, especially on matters that negatively affect the environment. The Act makes further provision for the Ministry of Environment and Tourism (MET) to spearhead assessment processes and to control activities that could have a negative impact on the health and status of the environment.

Listed below are some of the established principles on environmental management that are outlined in the Namibia Environmental Management Act No. 7 of 2007, and are of importance to this study:

(a) Equal access to environmental resources must be stimulated and the functional integrity of ecological systems must be taken into account to ensure the sustainability of the systems and to prevent harmful effects;
(b) Sustainable development must be promoted in all aspects relating to the environment;
(c) Namibia's cultural and natural heritage including its biological diversity which must be protected and respected for the benefit of present and future generations;
(d) Assessments should be undertaken for activities that may have a negative effect on the environment or the use of natural resources;
(e) Sustainable development must be promoted in all aspects relating to the environment;
(f) Damage to the environment should be prevented, whereas activities that cause such damage must be reduced, limited or controlled (MET, 2007).

Deforestation is a threat to the livelihoods of indigenous people who heavily rely on the goods and services offered by natural forest systems. The premise is that humans derive resources and products like wood for energy and depend on the lands for subsistence agricultural practices. The principles are aimed to guide the preservation of the environment for the present and future generations. The principles of the Environmental Management Act No. 7 of 2007 are closely linked to the governance procedures of deforestation, including other environmental hazards that may occur as a result of human-induced and natural factors. The CFP allows the active involvement of local communities in the management of woody and non-woody forest resources for their livelihoods and cultural benefits. The initiative further grants local community members equal access to the natural resources. Through community forests, the cultural heritage of indigenous communities and biodiversity can be preserved for the present and future generations.

2.4.2.2. The Forestry Act No. 12 of 2001

The Forestry Act No. 12 of 2001 provides a guideline for preserving and managing forest resources in accordance to the set global and local environmental management principles of biodiversity, conservation and management of natural resources. Generally, the Act deals with the forests and related matters in Namibia. Article 15(1) in the Forestry Act (12) of 2001 mandates the Minister of Agriculture, Water and Forestry (MAWF), with consent

from the relevant traditional authority, to grant local communities the rights to manage an identified communal land as a community forest.

The agreement entered into between the Minister of Agriculture, Water and Forestry and the community include, among others:

(a) Conferring rights, subject to the management plan, to manage and use forest produce and other natural resources of the forest, to graze animals and to authorise others to exercise those rights and to collect and retain fees and impose condition for the use of the forest produce or natural resources;
(b) Appoint the body that is party to an agreement to be the management authority for the community forest;
(c) Provide equal use and access to forest products to local members within the communal area.

On forest management, the Forestry Act No. 12 of 2001 aims to ensure that forest resources are well managed and developed. This may include initiatives such as tree planting where necessary, conserving soil and water resources, maintaining biodiversity and utilising forest products in a way that conforms to the primary role of forests as safety nets and enhancers of natural environments.

2.4.2.3. Namibia's Disaster Management Act No. 10 of 2012

The Namibia Disaster Management Act No. 10 of 2012 was gazetted in 2012 in accordance with the Constitution of the Republic of Namibia. On one hand, the Namibian Constitution advocates for the promotion and maintenance of the welfare of all Namibian citizens, through developing and implementing policies and subsequent plans for disaster risk management and reduction. On the other hand, the Disaster Management Act makes provision for the establishment of disaster risk management institutions in Namibia that, among others, provides integrated and well-coordinated disaster management approaches of preventing or reducing disaster risk, and mitigating potential impacts to vulnerable communities and the environment (NAM, 2012).

The Namibia Disaster Management Act No. 10 of 2012 defines disaster risk reduction as the concept and practice of reducing disaster risks through systematic efforts of analysing and managing the causal factors of disasters. This is done through minimised exposure to hazards and applying disaster risk reduction measures, including environmental management. In the disaster risk reduction context, forest systems are able to enhance the

resilience of people and the environment (SCBD, 2019). Forests act as natural barriers against heavy storms and winds. They also stabilise the environment to mitigate the impacts of future calamities such as landslides, they help regulate the climate and local temperatures, and lessen risks associated to soil erosion, land degradation and desertification. The disruptions in the normal functioning of the environment's results from multiple factors, including but not limited to:

(a) Natural disasters;
(b) Pollution;
(c) Limited natural resources;
(d) Environmental degradation.

The UNISDR (2017) classifies deforestation as a serious environmental hazard and a key factor of environmental degradation. Deforestation is caused by various factors, including natural factors like wild fires, and human-induced factors such as unsustainable harvesting of woody forest resources.

The CFP as a socio-environmental management measure constitutes active involvement of local communities in managing and conserving forest resources. This is carried out with the aim to ultimately prevent forest degradation, enhance natural resource governance and alleviate poverty among the poor communities.

2.5. Chapter summary

This chapter presented and discussed an overview of the theoretical and legislative frameworks on which the study was built on. The researcher discussed various models, including the Socio-Ecological System, the coupled human-environment system and the disaster management cycle. A theoretic analysis was also given on the relationship and interactions between humans and natural ecological systems. Additionally, the legal frameworks that are relevant in guiding the sustainable management of forests and guiding the role of community forestry in Namibia were also discussed.

CHAPTER 3
Literature Review

3.1. Introduction

The previous chapter presented the introduction and background of the study. Therefore, this section discusses literature review of the study. Sutton (2016) notes that literature helps researchers to establish a theoretical framework for their topic or subject area. It assists in defining key terms and terminologies and to identify study models that may help understand the subject under review. Lingard (2018) further notes that literature review provides a comprehensive review of past studies by accredited scholars. In this chapter, a review of the concepts and operational definitions that are relevant to the study and its objectives are presented. A systematic review approach described in Bolderston (2008) was adopted for this study. Siddaway (2014) describes the systematic reviewing approach as a review strategy that involves critical analyses and consolidates information of past studies into a literature review of a research in an objective manner.

3.2. Deforestation on a global scale

The terms 'forest degradation' and 'deforestation' are used interchangeably because their definitions are seemingly inter-related. As per Ghazoul *et al.'s* (2015) definition, forest degradation is the state of anthropogenic-induced series and severe diminishing of ecological process and forest ecosystems. Islam and Sato (2012); Maina *et al.* (2013) describe deforestation as the excessive clearing of forest ecosystems and gradually converting them into non-forested areas for such purposes as agriculture, establishing new settlements or rangelands. Deforestation is the permanent damage and change of previously forested area to non-forests with the purpose of availing the land for other uses. This definition correlates with that of Faiza *et al.*, (2017) who distinguish deforestation as the rapid and massive anthropogenic or natural clearance of a previously forested area that often results in deterioration of the forest area and leads to negative environmental impacts.

Olagunju (2015) clearly distinguishes between forest degradation and deforestation asserting that deforestation is the permanent loss or reduction of the forest cover. This phenomenon is also sometimes described as the conversion of previously forested land into bare land. It is closely linked to that of forest degradation, which is the substantial reduction of forest density and structure. The economic value of natural forests cannot be

over-emphasised. However, the benefits derived by the local people are widely suspected as the main factor of deforestation. Tanyanyiwa and Chikwanha (2011) contend that the increase in demand of forest resources have a significant effect towards management of forest ecosystems that often culminate into deforestation and subsequent land degradation. Duguma *et al.,* (2019) highlight that deforestation often culminates into notable reduction of the capacity of ecosystems in the provisioning of goods and services.

A gradual reduction in the forests worldwide is highly attributed to both the effects of human actions and natural calamities. Africa reportedly consists of the world's highest percentage of subsistence small scale farmers, whereas a significant number of people depend on forest resources for their livelihoods (Duguma *et al.,* 2019). Ironically, subsistence farming activities are one of the major factors of deforestation because forests are converted into crop land and rangelands, to ensure food security. The increasing demand of woody forest resources for energy and construction (Enbakom *et al.*, 2017), and the inevitable population growth also continue to play a contributing factor to deforestation.

Deforestation is a complex and one of the oldest challenges across the globe (Islam and Sato, 2012; Hanif and Gago-de-Santos, 2017). Deforestation is a big concern for both developed and developing countries, but it is the latter that are vulnerable and more affected by the consequences of the phenomenon (Chakravarty *et al.*, 2012).

Forests around the world will be faced with an increased risk of global collapse as Lindenmayer *et al.*, (2016) caution. This concept is defined as the widespread and long-lasting alterations in the state and dynamic of the ecosystem that have an adverse effect on biological diversity and essential ecological systems and their services. These drastic changes on natural systems are particularly rife in Africa, where most local people depend on forests as a source of livelihood (Enbakom *et al.*, 2017). Literature reveals that deforestation has significantly increased in the past decades because forests are being converted for agricultural benefits. These include, land uses like crop production, rangelands, infrastructural development and mining activities (Barraclough and Ghimire, 2000; Ruppel, 2013; Parrotta *et al.*, 2016).

Duguma *et al.*, (2019) assert that deforestation in the tropical regions continue unabated, posing a continuous threat to forests and on livelihoods of the communities. Evidence points out that 5.8% of forest cover was lost on a global scale in seven years, between 2010

and 2017 (Global Forest Watch, 2019). From the remaining forests, approximately 82% is degraded due to the impacts of direct or indirect actions of humans, including the inevitable increase in population, urbanisation trends, infrastructural development and agricultural activities (Watson *et al.*, 2018), among others.

3.3. Deforestation in Namibia

Namibia is classified as one of the driest countries in Southern Africa and most vulnerable to the impacts of climate change (MET, 2011). The country's forests are characterised as dry and semi-arid to open woodlands, mainly found in the deep Aeolian Kalahari sands, in the North-Central and North-Eastern parts of the country (MAWF, 2011). The forests in these parts of the country consist of dominant tree species such as *Baikiaea plurijuga*, *Guibourtia coleosperma, Burkea africana* and *Colophospermum mopane.* These tree species are regarded as favourable for household usage for practices such as constructing traditional homesteads, fencing and livestock kraals. Other woody species such as *Pterocarpus angolensis* and *Scelrocarya birrea* are also highly valued because of their economic and cultural values that they contribute to the livelihoods of indigenous communities.

Deforestation is a global challenge and Namibia is not an exception. Ruppel (2013) reports that Namibia had about 7.7 million hectares of forest cover in 2010, equivalent to about 9.3% of the country's total surface area. However, recent statistics depict that about 2% of the Namibian forest cover has been lost in recent times. Deforestation in Namibia, as in most Southern African countries, is influenced by multiple factors. This may include factors such as the high demand of trees for fuel/energy, expansion of land for agricultural activities and clearing land for infrastructural development. Ruppel (2013) further highlights that wild fires are also among the major environmental threats to the Namibian forests. Rural communities are mainly the direct users and beneficiaries of natural forest systems, because natural resources are regarded as long-term reliable sources of livelihoods (Mbidzo, 2016). However, unsustainable utilisation and mismanagement of natural systems is observed in rural areas, and may increase climate-related risks that may undermine the well-being of local communities.

The distribution of forests across the globe is mainly determined by climatic conditions, mainly constituting of temperature and rainfall variability. The vegetation in Namibia is

classified into three ecological zones: the Namib Desert vegetation (16%); the Savannah (64%); and the dry woodlands which cover about 20% of the land (Hecht, 2010).

Bennett (2017) notes that there are numerous factors and driving forces of deforestation across the globe. These factors vary greatly and are widely categorised into natural and anthropogenic factors. Islam and Sato (2012) describe the underlying factors as those elements that are likely to create an environment where increased deforestation may occur. The underlying factors of deforestation can be complex and may include manifold variables such as political, social, technological and cultural aspects (Geist and Lambin, 2001; Mabasa and Makhubele, 2016).

Reviewed literature revealed the underlying causes or factors of deforestation categorised into five broad classes, namely: economic factors, demographic factors, technological factors, policies and institutions, as well as socio-political factors (Geist and Lambin, 2001). Gorte and Sheikh (2010) identify and acknowledge governance as one of the underlying factors of deforestation in tropical forest regions of Africa. The limited prioritisation of forest protection and conservation, inadequate law enforcement, limited incentives or financial resources and the notion of treating forests as common areas are among the governance issues that are linked to increasing the rate of deforestation (Gorte and Sheikh, 2010).

The main causes of environmental challenges in the Northern regions of Namibia are linked to population growth, limited knowledge capacity of communities, limited awareness and a lack of knowledge transfer among local communities. The increase in population size means an increase in the household demands and consumption which prompts uncontrolled exploitation of natural resources, together with unsustainable agricultural activities (Enbakom *et al.*, 2017).

Globally, factors leading to deforestation are attributed to poverty. However, the phenomenon is caused by various factors, both natural and human-induced. Economic-related factors are one of the common underlying factors of deforestation. The economic value of natural resources, particularly timber products, is perceived as an immediate cause of deforestation, especially in developing countries where approximately 13 million ha of the forest is cleared on an annual basis (Islam and Sato, 2012; Enbakom, *et al.*, 2017). Deforestation is increasingly being influenced and driven by growth in international or national timber markets and failures in markets are reported as the main drivers of

deforestation. Hence, trading of timber products is also a contributing factor of deforestation (Leblois *et al.*, 2017). However, policy measures aimed at influencing land use practices, the mismanagement of natural resources, including corruption claims in the forestry sector, can also be prominent factors of deforestation. Taubert and Pretzsch (2007) report that cultural attitudes of society may positively or negatively have an influence on forest systems and overall on natural resource management.

3.4. The importance of forests to local communities

In the past, humans were afraid of living in forests as they considered them as wildlife habitats only, and were associated with bad spirits in certain areas (Matthews *et al.*, 2000). However, indigenous people started to live in forests at very low population densities distributed among small settlements. Globally, forests began to be greatly valued due to their role in socio-economic advancement and the goods and services they provide to communities, particularly in developing countries (Matthews *et al.*, 2000). It is estimated that approximately 250 million people across the world currently live in forests where their livelihoods and cultural characteristics are profoundly devoted to natural flora and fauna (Watson *et al.*, 2018).

Forests in Southern Africa are important for their contributions towards livelihoods and building national economies. Hence, increased vulnerability of forests would have adverse implications on communities and economic outlook of countries that depend on them. Forests provide local communities with various goods and services such as food, shelter, water, wood (Trosper and Parrotta, 2012; Bennett, 2017). The forests also help to regulate local and global weather conditions by absorbing greenhouse gasses from the atmosphere and play a key role in the formation of rainfall. Rainfall is very important to farmers whose livelihoods depend on crop and livestock farming as both these activities mostly rely on rain water.

Trees species and other forest products are important sources of income essential for the livelihoods and well-being of communities (FAO, 2018). The resources extracted from forests increase the vulnerability of communities to social and environmental risks, and reduce their resilience (Jenkins and Schaap, 2018). Matthews *et al.*, (2000) highlight that forests' products, both timber and non-timber forest products, continue to be of high significance to rural communities who directly depend on them for their livelihoods. Butler (2019) reports that forest ecosystems provide essential renewable resources that are

important for local and national economic growth. Not only that but forests are also essential biotic components in natural environment systems because they help to stabilise the environment and maintain balanced ecological systems which equally is beneficial to the state and health of the forest (Appannagari, 2017). However, over-dependency on natural resources results in degraded forested lands which imply negative effects on the livelihoods of people and their sustainability.

It is worth noting that there are no significant forests in Namibia, with their distribution making up less than 10% of the total area of the country (Barnes *et al.*, 2010), however, the importance of forests to local communities cannot be over-emphasised. A variety of benefits is derived from forest ecosystems, and may include, but is not limited to religious, historical, cultural, and aesthetical values. For example, forests are valued for providing shelter for both people and livestock. Communities can initiate nature-based activities aimed at educating communities about the risks and consequences that may result from deforestation. Instilling a sense of ownership among the local indigenes or cultural settings which prove to be effective in ensuring sustainability of both the environment and social well-being would be useful. The local communication strategies are valuable in the identification and development of effective strategies that can assist the indigenous communities to reduce deforestation and its subsequent adverse consequences. Therefore, indigenous cultural beliefs can be influential in determining the way in which human activities can be effective in the management of natural resources (Asongu and Jingwa, 2012).

3.5. Immediate factors contributing to deforestation

The immediate or proximate causes of deforestation are organised around human actions and activities towards the environment (Geist and Lambin, 2001). Forest ecosystems continue to be under enormous pressure especially from humans, particularly in developing countries (Matthews *et al.*, 2000). Asongu and Jingwa (2012) point out that population growth puts pressure on natural resources and forest ecosystems through practices such as harvesting wood for energy or construction, clearing land (forests) for agricultural purposes, and timber extraction, among other activities. The increase in population and economic growth are key driving forces that lead to rapid conversion of forests into agricultural land (Leblois *et al.*, 2017; Zhang *et al.*, 2017; and Duguma *et al.*, 2019). The

gradual increase of the Namibian population has a significant impact on natural resource utilisation, especially in rural areas (Mwangi *et al.*, 2013).

Asongu and Jingwa (2012); Mabasa and Makhubele (2016) however draw our attention to the fact that population growth is a trending concern, with worries on whether natural resources will be able to sustain the rapid population expansion in most parts of the world. Mohammed (2014) and Bennett (2017) report that the increasing need for agricultural land is among the manifold factors of deforestation. Generally, as the population grows, the demand for land also increases and this may subsequently culminate into degradation of the land and forest. For these reasons, the United Nations classified subsistence farming practices as one of the major factors of deforestation, especially in developing countries. Besides that, forests are also cleared for economic development purposes such as mining and infrastructural development. Natural factors such as veld fires and conditions that result from climatic variabilities are also not ruled out on the factors of deforestation.

Forest resources, both woody and non-woody products are valued primary sources of livelihood, especially by the rural people in poor developing countries (Nicodemus and Hájek, 2015). Most rural societies in Namibia primarily depend on natural resources benefitting through health products, food products, income and cultural services (Olagunju, 2015). The income generated through commercialising forest resources greatly makes a positive contribution towards rural economic development prospects (Barrow *et al.*, 2016). Urech and Zaehringer (2015) point out that rural communities derive countless benefits from forest resources, but often forest ecosystems end up on the receiving end of being threatened by degradation resulting from uncontrolled harvesting and resource utilisation. Leblois *et al.*, (2017) report that the expansion of agricultural crop fields is one of the main contributing factors to deforestation in recent years. This cannot be overemphasised because it is attributed to population growth. As the population increases, so does the demand for food and energy. The FAO (2018) ranked agricultural practices among the highest factors contributing to deforestation, when compared to other anthropogenic factors. Apart from agricultural activities, communal communities also utilise natural biomass for livelihood practices such as energy for cooking and lighting, construction of homesteads and pharmaceutical utilisation. Furthermore, forest resources hold a high cultural value and are significant for use in indigenous practices.

3.6. Effects of deforestation

There is a global concern regarding the impacts of deforestation in the 21st century due to mixed effects such as socio-economic gains and the associated adverse effects. Deforestation or insecure land tenure can have both positive and negative effects on the environment and communities (Robinson *et al.*, 2011). Some of the renowned results of deforestation include increase in global temperatures, land degradation and a negative impact on biodiversity (Tindan, 2013). Other remarkable effects include negative environmental issues such as exacerbated flooding, while humans are impacted through forced cultural displacement and loss of natural resources to meet their socio-economic needs (Faiza *et al.*, 2017). Therefore, deforestation adversely impacts the environment and socio-economic status of majority of communities around the world; reduces economic gains and ultimately hinders sustainable development (Jenkins and Schaap, 2018).

3.6.1. The effect of deforestation on people's livelihoods

Deforestation has multiple effects on livelihoods, particularly on rural communities who depend on natural resources. Communal people exploit natural resources for various purposes, such as wood (biomass) for energy, clear forests for agricultural activities, and are often prompted to clear large areas for agricultural purposes (Enbakom *et al.*, 2017). These actions of the communities may end up exposing their well-being and the environment to risky hazards. Mohammed (2014) highlights that deforestation has severe consequences on developmental dimensions, including but not limited to social, natural (environmental) and economic scopes.

Enbakom *et al.*, (2017) identify soil erosion and land degradation as part of the results of deforestation that can permanently compromise the productivity of the land, and consequently have a negative effect on people's livelihoods. The estimated losses encountered as a result of deforestation are virtually based on the value communities place on forests in their natural states. Deforestation is reported to cause a reduction in providing ecosystem goods and services provided by forest ecosystems, particularly in developing countries (Duguma *et al.*, 2019). Mohammed (2014) is of the view that deforestation exposes the surrounding environments of rural communities to soil erosion. However, deforestation not only compromises the livelihood base of most communities but, also has a negative impact on biodiversity, and to a certain extent, undermines the value of indigenous knowledge and their authority over natural resources (Watson *et al.*, 2018). Enbakom *et al.*, (2017) expresses that the resulting effects of deforestation on land

productivity and agricultural output have negative effects on community livelihoods and can risk local development prospects. Thus, it is a challenge to strike a balance between development activities and biodiversity, especially in the face of climate change, increasing population growth and the relative high demand of natural resources (Meijaard *et al.*, 2013).

Ibrahim *et al.*, (2016) agrees that most economic activities that communities rely on for their livelihoods are threatened by deforestation. The authors further emphasise that deforestation substantially minimises the supply of forest resources, exacerbates flooding or drought incidences and subsequently the loss of nutrient-rich top soils, resulting in desertification. On the other hand, alterations in rainfall patterns may have huge effects on agricultural production as it reduces the yield of farmers and rural communities who rely on rain-fed agricultural activities, leaving communities vulnerable and exposed to food insecurity (Mohammed, 2014). Butler (2019) attests that instances occur because a reduction of forests result in limited evapo-transpiration process in the atmosphere, resulting in reduced rainfall, exposed environments and high risks of communities to drought incidences.

Deforestation is also triggered by the lack of developmental infrastructure in communities. Abman and Carney (2019) highlight that most communal communities do not have alternative energy sources to meet their daily needs, and thus tend to over-rely on woody forest resources as a primary source of energy, consequently increasing deforestation. Abigaba *et al.*, (2016) observe that the scarcity of fuel wood has a negative impact on the livelihoods of rural communities. Wood scarcity prompts communities to use unreliable sources of energy like stalks of pearl millet and sorghum rather than wood and construction logs from forests (Abigaba *et al.*, 2016), or people sometimes use cattle dungs for cooking. Women are the most vulnerable because they are forced to walk long distances to access woody forest resources (Abigaba *et al.*, 2016). This is because women are duly known for having the primary responsibility of collecting wood for fuel, fodder and non-woody forest resources in rural areas (Asselin, 2015). Women become exposed to being raped when carrying out their household duties and this may tarnish their images and dignities. In addition, the household chores done by women also deprive them of the opportunity to engage in productive activities at community level (Chaudhary *et al.*, 2016). In most societies, women play important roles in household activities compared to men.

Mohammed (2014) highlights that deforestation has a negative effect on the livelihood of communities, especially poor people who rely on natural resources for their livelihood. Rapid deforestation not only reduces the availability of timber products but it also diminishes valued pharmaceutical plants used by communities. Fullerton (2017) reports that about five billion people around the world depend on forest-based traditional medicines for primary healthcare.

3.6.2. Impacts of deforestation on indigenous cultures

Globally, forests are homes and sources of not only supporting services but, also sources of cultural ecosystem services to many indigenous communities. It is estimated that about 4% of the world's population, mostly indigenous people, reside in special designated territories. Indigenous people rely on the goods and services that forest ecosystems provide. They also tend to settle in certain areas where cultural and spiritual ties are developed and used to manage and sustain themselves and the environment. Hence, indigenous identities and cultural practices have long been associated to traditional lands (Asselin, 2015). Patten (2016) describes culture as a belief that develops from the reactions of humanbeings to nature and life. The effects of deforestation on the livelihoods of indigenous communities covers different perspectives such as fuel wood, agricultural production and shelter, just to mention a few.

3.6.2.1. Fuel wood

Indigenous communities rely on forests as their main sources of wood for energy. However, deforestation has manifold social consequences (Tejaswi, 2007) which often results in long-term devastating impacts. Additionally, deforestation is not only a serious threat to people's livelihoods but also a prominent challenge to the cultural integrity of people who overly dependent on forests (Kanninen *et al.*, 2007). Deforestation has a negative effect on the traditional lifestyles of indigenous communities and can result in the displacement of communities from their ancestral lands (Chakravarty *et al.*, 2012). The substantial reduction in forests could make it difficult for indigenous communities to have access to fuel wood used for their daily livelihood activities.

3.6.2.2. Agricultural production

Faiza *et al.*, (2017) is of the view that, apart from deforestation having adverse impacts on agricultural production and biodiversity, it may also cause actual displacement of

indigenous communities. For example, most rural indigenous communities rely on underground water sources for portable water in their households. The rapid removal of trees due to deforestation may deplete the amount of underground water recharging aquifers and may result in a shortage of water supply to communities. Communities may even end up being temporarily or permanently displaced when natural resources become scarce or depleted. Normally, nomadic people migrate from one place to another in search for better rangelands to accessible natural resources.

Rural communities in North-Central Namibia rely on natural resources and subsistence crop and livestock farming for their livelihoods (Nikodemus and Hájek, 2015). During high rainfalls, natural systems and livelihood sources are negatively impacted and may culminate into community displacements and further damages incurred towards forest ecosystems. Similarly, the availability of cultural important assets or values is compromised during drought events. Crops and livestock production are not guaranteed during drought conditions. In numerous occasions, indigenous communities may also be forced to move into areas that are already occupied by other indigenous groups, putting more pressure on the little resources available in those specific areas. The destruction of forest systems leads to displacement of people (with negative effects on indigenous communities who are forced to change their ways of living by reconsidering a change to their resource base); impoverishment and total loss of livelihoods (Nikuze *et al.*, 2019).

3.6.2.3. Social gatherings and community meetings

In social settings, communities can use trees and forests for judicial practices, while some indigenous people may use trees for practices, such as identifying boundaries. Trees provide valuable venues for indigenous community meetings, where they can discuss, argue and reach consensus on issues of concern. Shaded trees can also be good areas for social, judicial and political events which require decisions to be heard and made at community level.

Oubangui tribes in Central Africa are known to plant trees for new born children (Upadhaya *et al.*, 2005), whereby the child's development gets linked to the growth of the tree. The growth state of that particular tree is then ritually linked to the health of the child, whereby if the growth of the tree declines; it shows an indication of the health state of the child deteriorating and a traditional healer is brought in. The sick child is often taken to the tree for ritual treatment.

3.6.2.4. Spiritual monarchs

A strong relationship exists between forest ecosystems and spiritual monarchs of indigenous communities around the world (Eyong, 2007). For example, European cultures previously considered forests as positive cultural sites of miracles and a place of awakening spirits, thus regarded as sacred forests. These could be forests instilled with spiritual powers, as they are mostly used as burial sites for ancestors, and are essential for indigenous communities to communicate with their ancestors.

Since sacred forests receive minimal disturbance from humans, they developed the characteristic of surviving for longer periods, and thus can be used as important genetic banks.

3.7. Environmental effects of deforestation

3.7.1. Deforestation and desertification

Literature recognises desertification as one of the major global environmental problems that have been experienced since the 1970s (Cullet, 2001). The United Nations Convention to Combat Desertification (UNCCD) defines the desertification concept as the degradation of land as a result of unsustainable human interferences or changes in global climatic conditions. Simply put, desertification can be described as the total destruction of the productive potential of the land that often results in permanent conversion of productive land into a desert. Cullet (2001); and Hill (2010) note that desertification is more evident in Africa, where an overwhelming 65% of agricultural lands are exposed to degradation and Namibia is no exception. This statistical evidence is worrisome, given the fact that about two thirds of the African continent is already comprised of dry lands or deserts, making the continent highly vulnerable to desertification (Penny, 2009).

Desertification is one of the threats to biodiversity in Namibia, because it reduces biomass, plant productivity and diversity, most of which are attributed to human activities (Byers, 1997). In the North-Central areas of Namibia, inappropriate subsistence farming practices are among the risk factors that can lead to desertification. Cullet (2001) reports that overgrazing, over-cultivation, salinization of irrigated lands and deforestation are among the direct human-induced causes of desertification.

3.7.2. Deforestation and climate change

A close link exists between forests and climate change and has recently become a huge concern to humans (Ali *et al.*, 2014). Deforestation has numerous impacts on the environment and is also responsible for climate change. Leblois *et al.*, (2017) express a concern that tropical deforestation will remain a challenging global issue towards climate change if no measures are undertaken. Rapid deforestation leaves communities around the world exposed to high risks of climate change, accompanied by variations in rainfall patterns (Tanyanyiwa and Chikwanha, 2011; Mohammed, 2014). The International Union for Conservation of Nature (IUCN, 2015) reports that about 30% of the global forests have already been cleared out with a further 20% continuing to be degraded. The report further indicates that deforestation is accountable for about 24% of the total global emissions, as compared to emission contribution of transportation (IUCN, 2015).

The build-up of heat in the atmosphere, well known as the greenhouse effect, is one of the consequences of deforestation. Deforestation results in adverse effects on wind and water vapour flows that influence global climates (Mohammed, 2014). This results in severe interruptions of normal weather patterns by generating hot and dry weather conditions that exacerbate drought incidences and desertification. Jenkins and Schaap (2018) caution that biodiversity loss possibly makes forests less resilient to cope with global threats, such as climate change and land degradation. If not controlled, it may contravene with the prospects set under the Sustainable Development Goals (SDGs) adopted in 2015 by the United Nations Development Programme (UNDP) to substantially curb deforestation by the year 2020. Sometimes referred to as “the lungs of the world”, forests are important carbon sinks that help in mitigating climate change (Popo-Ola *et al.*, 2012). However, changes in land use practices that increase food production also reduce the capacity of forest ecosystems to absorb and store carbon (White *et al.*, 2000).

Deforestation, as a contributing factor to climate change could exacerbate global environmental impacts that ultimately affect economies and the livelihoods of the communities (Timilsina-Parajuli *et al.*, 2014). The extension of global environmental challenges may severely impede developmental prospects of most developing countries, like Namibia. Arid conditions comprised of variable rainfalls and relatively extreme conditions making Namibia one of the most vulnerable countries to climate change in Southern Africa.

Developed countries are widely blamed for their high emission of greenhouse gases but are less threatened by climate change compared to developing countries. Ironically, Namibia is one of the countries which is mostly affected by climate change (MET, 2011), due to its low coping capacity. Wang and Dong (2019) argue that sub-Saharan African countries, for instance, are accountable for less pollution compared to other regions or continents but the economic expansion and increased urbanisation increases energy demands that lead to negative effects on the environment. Unregulated utilisation of natural resources leads to massive clearance of forests and ultimately culminates into deforestation, a contributing factor towards climate change.

On a global perspective, deforestation is identified as the second largest source of carbon dioxide to the atmosphere as a result of anthropogenic activities (UNEP, 2014). This is viewed in the sense that forests play major roles in decreasing the amount of harmful greenhouse gases that are emitted into the atmosphere. Timilsina-Parajuli *et al.*, (2014) argue that global rates of deforestation have negative effects on climate variability. This is characterised by increased temperatures, rainfall variability, and erratic climatic conditions around the world. The degradation of the environment and increased rates of deforestation have the ability of transforming and reducing the potential of forests from fundamental carbon sinks to great emitters of greenhouse gases into the atmosphere.

3.7.3. Deforestation and disasters

According to Ali *et al.* (2014) and Assunçao *et al.* (2017), the increased loss of tropical forest ecosystems has become one of the main causes of environmental disasters in the past century. Deforestation may contribute to the occurrence of the following associated disasters:

(a) Droughts

There is a link between deforestation and droughts. The loss of trees increases the chances of soil erosion by wind or excessive water run-off. Nutrient rich soils are eroded away, a phenomenon that could negatively impact the agricultural production of rural communities who depend on subsistence farming to sustain their livelihoods. Trees, through their root systems play an essential role in the recharge of underground water aquifers. They channel water into the underground aquifers where they are stored and later act as a supplier to rivers and boreholes during the dry seasons. Bagley *et al.*, (2014) reason that the changes in forest cover potentially increase the occurrence and impacts of droughts and could have

long-term consequences. For example, reduced absorption of carbon from the atmosphere, subsequently culminating into reduced precipitation and often resulting in reduced crop harvests.

Therefore, forests are vital in building resilience in natural ecological systems (Thompson *et al.*, 2009). They can act as protective buffers against different catastrophes, such as wind storms to prevent erosion, provide moisture and clean air into the atmosphere.

(b) Flooding

Deforestation results in an increase in earth surface temperatures, as a result of increased carbon emissions. (Strasser *et al.*, 2014) note that excessive cutting down of trees causes global and regional changes in climatic patterns that culminate into heavy rainfalls and prolonged drought periods. The melting of the polar ice, as an attribute of climate change, is reported to cause a rise in the sea level (Church *et al.*, 2013). Climate change is expected to intensify in frequency and magnitude of extreme weather events such as floods. Recurrent floods may result in continous mortality, permanent displacement of communities and damage to infrastructural developments.

(c) Landslides

Deforestation can cause natural disasters such as landslides, due to the fact that trees that are supposed to firmly hold the soil particles are removed. The traditional practice of shifting cultivation is highly linked to the occurrence of landslides as lands are cleared and trees uprooted for cultivation purposes, resulting in huge amounts of soil particles being washed away during heavy rainfalls. Landslides can cause severe environmental consequences, such as exacerbating deforestation, depleting nutrient-rich soils suitable for cultivation and increased sedimentation in riverine systems (Forbes and Broadhead, 2011). However, Gerrard and Gardner (2002) argue that deforestation may not be the only sole cause of soil erosion and landslides, because it largely depends on the way the land is managed.

(d) Forest fires

Forest fires can be caused naturally or by human-induced activities. In natural circumstances, fires occur naturally during dry seasons because of the heat and abundant fuel load or caused by lightning. However, human-induced forest fires occur during land clearing practices (slash and burning) for agricultural production. The slash and burn is common among communities who practice shifting cultivation. Thus, forest fires occur

when people burn small or large portions of land in order to create agriculturally-suitable land for production. When wild fires get beyond human control, they burn large forested areas and may result in deforestation.

(e) Disease outbreaks

Most medicines found in the world are derived from trees and herbs found in notable forests such as the Amazon. The augmented loss of forests could mean a reduction in the supply of medicines, and consequently increased disease outbreaks. For example, the outbreak of deadly diseases such as Ebola, among others is one of the subtle and serious effects of deforestation (Butler, 2019). As the population increases, more people move deeper into the forests to occupy land. Due to human disturbances on forests, the primary hosts of disease-causing pathogens are reduced or eliminated through practices such as poaching. Thus, this movement leads to the outbreak of deadly epidemic diseases among humans (Butler, 2019).

3.8. Deforestation and forest ecosystems

Forests are important ecosystems that support variety groups of plants and animals, including vital ecosystem services. Literature shows that there is no clear or specific definition for forest ecosystems as forests can be described in different perspectives and management objectives. Mohammed (2014) asserts that defining forests is sometimes not easy because of the wide variety of forest types that occur in the world. As a result, a common misunderstanding always emanates in the quest of finding meaningful definitions and perceptions concerning forests (Liebhold *et al.*, 2017). These authors further reiterate that forests are observed from different land cover perspectives, normally as ecosystems that support unique groups of animals and plant species. However, from a land use perspective, they can be classified as legally designated lands irrespective of their vegetation cover or species composition. Liebhold *et al.*, (2017) allude that a wide range of forest definitions are necessary to fully understand the forest systems concept in all its dimensions.

In a nutshell, forests are landscape components, social-ecological systems and vital homes to a wide-range of living organisms (Chazdon *et al.*, 2016). The United Nations Convention on Biological Diversity (2010) technically defines forests as areas of at least 0.5 hectares (ha) in size, consisting of a tree canopy cover that exceeds 10% of the total

area cover. Forests can be natural or man-made ecosystems. Primarily, forest ecosystems are formed by various tree species that determine the canopy cover of the forest (Nix, 2018).

A report by the FAO (2015) shows that forests cover approximately 31% of the total area of the planet, an equal conversion of 650 million hectares of land. It is estimated that 1.6 billion people reside in forests and are dependent on forest ecosystems for their livelihood (World Bank, 2002). Forests are important homes to a variety of species, including indigenous communities who form important social-ecological systems that offer multiple benefits (Liebhold *et al.*, 2017). This means that forest ecosystems are plain ecological units that provide home to both indigenous and new living and non-living organisms (Nix, 2018).

Similar to other types of ecosystems, forests provide valuable provisioning, regulating, supporting and cultural services. Also dubbed as "nature's services", forests provide various benefits to people, the environment and other living organisms that depend on natural resources for survival (Hill, 2010).

3.8.1. Tropical forests

Scientists believe that tropical forests have played a key role in the initial development of biology in past centuries, ultimately inspiring the development of the theory of evolution through natural selection (Thomas and Baltzer, 2002). These type of forests are mainly found in areas that receive relatively high rainfalls, normally situated between the Tropic of Cancer and the Tropic of Capricorn, hence the name, tropical forests. The tropical rainforests house about 80% of the total biodiversity on earth (Woudon, 2017), and are regarded as vital systems for humanity because of their contribution towards the earth's ecology and the pharmaceutical resources they possess. In addition, tropical forests are important in regulating climate (Watson *et al.*, 2018).

Given the definition of the tropical forests, the area under study, Otshiku-shiIthilonde Community Forest, is located between the Equator and Tropic of Capricorn and thus forms part of the Tropical Forests. Sparse forest cover is dominant in the Oshana and Omusati regions. These regions are estimated to have a combined average of 32.6 trees per hectare (Curtis, 2005). Although there are no prominent timber species in the north-central regions, trees such as the *Colophospermum mopane* are valued for their traditional use such as construction, medicine and wood for energy supply in the rural areas. However, the growth

and harvesting of forest products is affected by dominant dry conditions in Namibia, unlike other countries in Southern Africa.

3.8.2. Temperate forests

From a broad perspective, temperate forests are defined as all the forested areas found in the north and south of the Tropic of Cancer and Tropic of Capricorn. Temperate forests are globally unique and important because they are home to the worlds' largest and oldest organisms (De Gouvenain and Silander, 2017). Apart from tropical forests, temperate forests are the second richest in species diversity compared to boreal forests (Gorte and Sheikh, 2010). They are recognised as the largest suppliers of woody products including timber and have been proven as the only forest systems that have sustainable management potential. Temperate forests provide essential ecosystem services both at local and on a global scale, and are important carbon sinks that lessen the concentration of harmful carbon emissions. Statistical data shows that temperate forests contribute approximately 17% towards the primary global net productivity, while tropical forests contribute about 49%, whereas boreal forests contribute about 8% to the global net productivity (De Gouvenain and Silander, 2017).

De Gouvenain and Silander (2017) highlight that temperate forests have not been severely affected by the global 6% decline in forest between 1990 and 2015. However, climate change is perceived to become a global threat to forest ecosystems and temperate forests are to date, getting threatened by deforestation.

3.8.3. Boreal forests

Boreal forests, also referred to as Taiga forests, are situated approximately 50 Degrees Celsius north latitude, and cover approximately one third of the planet (Gorte and Sheikh, 2010). This forest type is comprised of relatively few tree species with slow growth rates and dominated by wildfires. Gorte and Sheikh (2010) assert that boreal forests are highly essential in carbon sequestrations due to their relatively high storage capacity of carbon.

3.9. Strategies for Sustainable Forest Management

Forests around the world, particularly in Africa, are faced with severe depletion and degradation especially in the communal areas. However, strategies are continuously being explored in order to enhance Sustainable Forest Management (SFM). The development

policies while abiding to international standards and others initiatives include the measures of including communities who are direct beneficiaries and major users of natural resources in the active management of resources. In order to influence policy decisions to arrest deforestation, tangible evidence is needed to demonstrate the benefits of SFM. Incorporating traditional knowledge of indigenous communities in forest management could be beneficial in sustaining forest ecosystems.

According to Parrotta *et al.*, (2015) multifaceted forest management strategies are embedded in the application of indigenous knowledge in the management of natural resources. This is seen through activities such as agroforestry systems and shifting cultivation, continuing to provide necessities to communities without risking the health and function of forest ecosystems. In support of the idea of local community involvement, Bennett (2017) believes that forest ecosystems around the world can be saved through environmental-based strategies with guaranteed participation of local forest resources users and beneficiaries.

Two common strategies employed in most rural settings and countries of Southern Africa, including Namibia were reviewed and are discussed in the subsections below.

3.9.1. Indigenous knowledge and forest management

Approximately 17 million indigenous people, most of who are in rural community settings, depend on forests for their livelihood needs (SCBD, 2019). Indigenous communities not only rely on forests for shelter, food and other forest resources but they play an integral role in conserving forest ecosystems. Literature reveals that indigenous knowledge is largely side-lined in planning and decision-making platforms (Tejaswi, 2007) as the indigenes are generally viewed as ordinary stakeholders (Stevenson and Webb, 2003; Cheveau *et al.*, 2008). Thus, Asselin (2015) urges the need to develop essential mechanisms that would incorporate indigenous knowledge at all steps and processes of managing forest ecosystems in a sustainable way. The author further suggests that the best tool to be developed in this regard could probably be maps as the social acceptance of forest-related operations which are hugely based on cohabiting of forests users who seek and value the ecosystem goods and services differently. However, the challenge could arise from the unwillingness of communities to share cultural important information that is sensitive (Berkes, 2012).

Nonetheless, Abbott and Wilson (2015) recognise the participation of indigenous communities in natural resource management, arguably, as the best strategy in managing forest ecosystems. This has assisted communities globally to survive for prolonged periods (Iloka, 2016). There is increasing recognition of the value of indigenous or traditional knowledge among decision-makers, governments, civil organisations, and scholars (Trosper and Parrotta, 2012). The indigenous practices and knowledge possessed by indigenous communities have for long supported and maintained the livelihood of communities who are largely dependent on forest ecosystems (Trosper and Parrotta, 2012).

In the face of global challenges, such as climate change and escalating establishment of market economies, the traditional knowledge on natural resource management possessed by indigenous communities, including the traditional methods of production, play a pivotal role in enhancing the long-term bond with natural resources (SCBD, 2019). This strong relationship may also help to combat forest degradation and equally lessen disaster risks related to climate change by reducing carbon emissions from deforestation activities, while ensuring the fulfilment of social needs (International Labour Organisation, 2017). Conservation of forest resources is a global effort intended to safeguard natural systems. Indigenous knowledge is a fundamental base for decision-making processes related to conservation and most livelihood activities, ranging from agriculture, education and management of natural resources (Nimachow *et al.*, 2011; Tanyanyiwa and Chikwanha, 2011). Indigenous communities have multiple knowledge about nature (Igwe, 2016). Mostly locally-based, the possessed knowledge provides a level of details that cannot be achieved through other means (Asselin, 2015). Asselin (2015) further asserts that indigenous forest knowledge is not only environmentally-based but also culturally-based.

Berkes *et al.*, (2000) refers to traditional forest knowledge as a collective body of knowledge, practices and beliefs transferred from generation to generation through cultural norms that revolves around adaptive practices, and elucidates the linkage and interactions between humans and their surrounding forest ecological systems. Undoubtedly, indigenous forest knowledge is holistic, in the sense that it incorporates every element of the environment, including humans and how they are interconnected and able to influence each other (Asselin, 2015). Owing to its holistic nature, indigenous knowledge originates from the continuous interactions between societies with their surrounding environment, a relationship which Abdullahi *et al.*, (2013) believe is developed based on specific conditions of human inhabitants in a particular geographic setting. Berkes (2017)

documents ways in which indigenous knowledge can positively contribute towards the sustainable management of forest ecosystems. These are: through providing genetic information and biological insights which can be an alternative management practice for conserving biodiversity. It can also be essential in the support for social development, valuable in environmental monitoring and evaluation, and also act as an important source for local environmental ethics.

Trosper (2007) documents an equally good example of how indigenous knowledge was effectively used in forest management practices by the *Menominee* tribe of Wisconsin in the United States of America. They selectively felled older trees that had valuable wood of quality that guaranteed them good financial returns from local market. They also ensured the maintenance of a good forest cover for other indigenous and cultural practices. Equally important, indigenous forests may also be used in preserving and managing Non-Timber Forest Products (NTFP).

Ayaa and Waswa (2016) believe that indigenous knowledge systems essentially contribute to efficient, effective and sustainable management of the environment for social development among communal societies, especially in least developed countries. Iloka (2016) shares a similar stance, revealing that indigenous knowledge possessed by communities offers treasured thoughts and great ideas on how they can overcome various types of problems encountered at the community level, in turn helping them to grow and advance. This knowledge forms the foundation of coping strategies of the communal communities that help them cope against different challenges over extended time periods. Literature reveals that indigenous knowledge plays an integral role in local communities for people to live in healthily with their environments for prolonged periods, thus also improving their environmental knowledge (Iloka, 2016).

Literature also depicts that indigenous communities can develop essential knowledge and wisdom on how to encounter local environmental challenges. Indigenous people are regarded as vital sources of wisdom and knowledge that is jointly relevant in continuous effort for the sustainable management of natural resources (Parrotta *et al.*, 2016). The authors further assert that during the early 19th century for example, local communities around the world managed forest landscapes in numerous ways that ensured their livelihoods and cultures were sustained. They did this without compromising the ability of the ecosystems to sustain future generations. Traditional knowledge embedded in cultural

values and norms have created a wide-array of practices for the management of natural resources that are vital in sustaining the communities (Parrotta *et al*., 2016).

Thus, the need of integrating the traditional knowledge in the valuation of forest resources, especially for enhancing the management of forests, should not be undervalued. Empirical studies have documented the value of cultural knowledge in management and conservation of ecosystems (Houde, 2007; de Freitas *et al.*, 2015; Cummings and Read, 2016). For example, indigenous people use cultural knowledge to consistently monitor the state of forests and assess the changes encountered, in place of scientific monitoring and assessment that prove to be costly. As indigenes spend majority of the time in the forested lands, they are often the first people to notice any changes that are observed on forest ecosystems. Therefore, Asselin (2015) believes that indigenous people are able to take regular records and continuous basis for forest assessments purposes, while also monitoring it on a long-term basis.

Cámara-Leret *et al.,* (2014) and Asselin (2015) agree that indigenous knowledge is essential in maintaining certain species in specific-areas, although, it can be site-specific and dynamic. However, Iloka (2016) cautions that the state and strength of possessed indigenous knowledge of the community can grow or shrink, depending on the social connectedness of indigenous communities.

Local communities, particularly communal inhabitants in Africa continue to use traditional methods to manage woodlands and forests to regulate the utilisation of forest products (Blomley, 2013). Spear *et al.*, (2018) assert that the majority of Namibians reside in rural/communal areas and historical records show that people in the North-Central and North-Eastern parts of Namibia strongly depend on traditional knowledge in managing and maintaining their natural-resource based livelihoods. Thus, indigenous people and the knowledge they possess are a key component to most forest ecosystems.

3.9.2. Community-based forest management in Namibia

In an effort to combat the loss of biodiversity and mitigate climate change, most countries are implementing large-scale policies with the aim of conserving forest ecosystems (Viña *et al.*, 2016). Nikodemus and Hájek (2015) indicate that the deforestation phenomenon in tropical forests have instigated the caution on whether global forest management practices, as enforced through policies, are effectively being implemented. In recent years, majority

of countries have come up with a variety of policies aimed at addressing the sustainable management of forest resources. It is perceived that the ended colonial era in most African countries instigated a more decentralised control over forest resources. Betru *et al.*, (2019) reaffirm the paramount importance of developing suitable, integrated measures and implementing relevant policies that aim to strengthen and promote the preservation of natural resources.

According to Bijaya *et al.*, (2016) the paradigm shift in forest governance comprise of the move to counteract on increasing incidences of unsustainable utilisation of natural forest resources. In so doing, this will address the ineffectiveness of certain existing institutions intended for SFM. Previously, this was more an administrative activity, than participatory. This new era is characterised by rural communities benefiting from natural resources for their livelihoods, while also sustainably managing for the general well-being of the environment and future generations. Consequently, the need for conserving woodlands and forest systems for sustainable development has prompted a number of developing countries in Southern Africa, including Namibia, to adopt strategies and mechanisms informed by legal and institutional frameworks. These frameworks are aimed at enhancing sustainable natural resource management (Tanyanyiwa and Chikwanha, 2011).

The people-centred programme renowned as Community-Based Forest Management (CBFM) or sometimes referred to as Community-Based Natural Resource Management (CBNRM) for effective management of natural resources, including forest resources, increasingly became famous from the early 1980s (Blomley, 2013; Duguma *et al.*, 2018). It has a considerably long history across the African continent. Blomley (2013) further alludes that community forestry is an effective mechanism for lessening deforestation. Community forestry is seen as an institutional, innovative and strategic programme aimed at empowering local communities through various means of accessing and sustainably benefiting from forest resources (Timilsina-Parajuli *et al.*, 2014), while at the same time playing an integral role in promoting local forest governance and sustainable utilisation of forest resources. This is a participatory concept that involves local people in active management of forest systems. Community forestry normally involves formal legal rights in conformity with customary traditional laws conferred to the communal inhabitants. Asongu and Jingwa (2012) commend the integration of social, cultural, ecological, economic and legal aspects into forest management programmes and policies, asserting that it is wise step of improving forest management at local level.

The Namibian government adopted the CBNRM programme in the early 1990s, and subsequently started implementing community forestry concept (Ndeinoma and Wiersum, 2017). The CBNRM programme is the umbrella for both communal conservancies and community forestry in Namibia and other countries in Southern Africa. Schusser (2012) reports that community forestry has become an important solution to the massive and on-going deforestation issue in Namibia. Tackling environmental degradation may be effective through the active involvement of local communities who are the main users and beneficiaries of the natural resources. These cost-effective and inclusive measures of the community forestry are essential in promoting the coping capacity and resilience of both communities and natural systems of the environment. Resilience is described as the ability of natural or artificial systems or communities exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner. This includes the manner of preservation and restoration of its essential basic structures and functions through risk management (UNISDR, 2017).

To date, the Namibian government through the line ministry (MAWF - Directorate of Forestry) have facilitated the gazette publication of 42 community forests (*Figure 3.1*), an initiative that has increased the participation of local communities in the sustainable management of forests ecosystems.

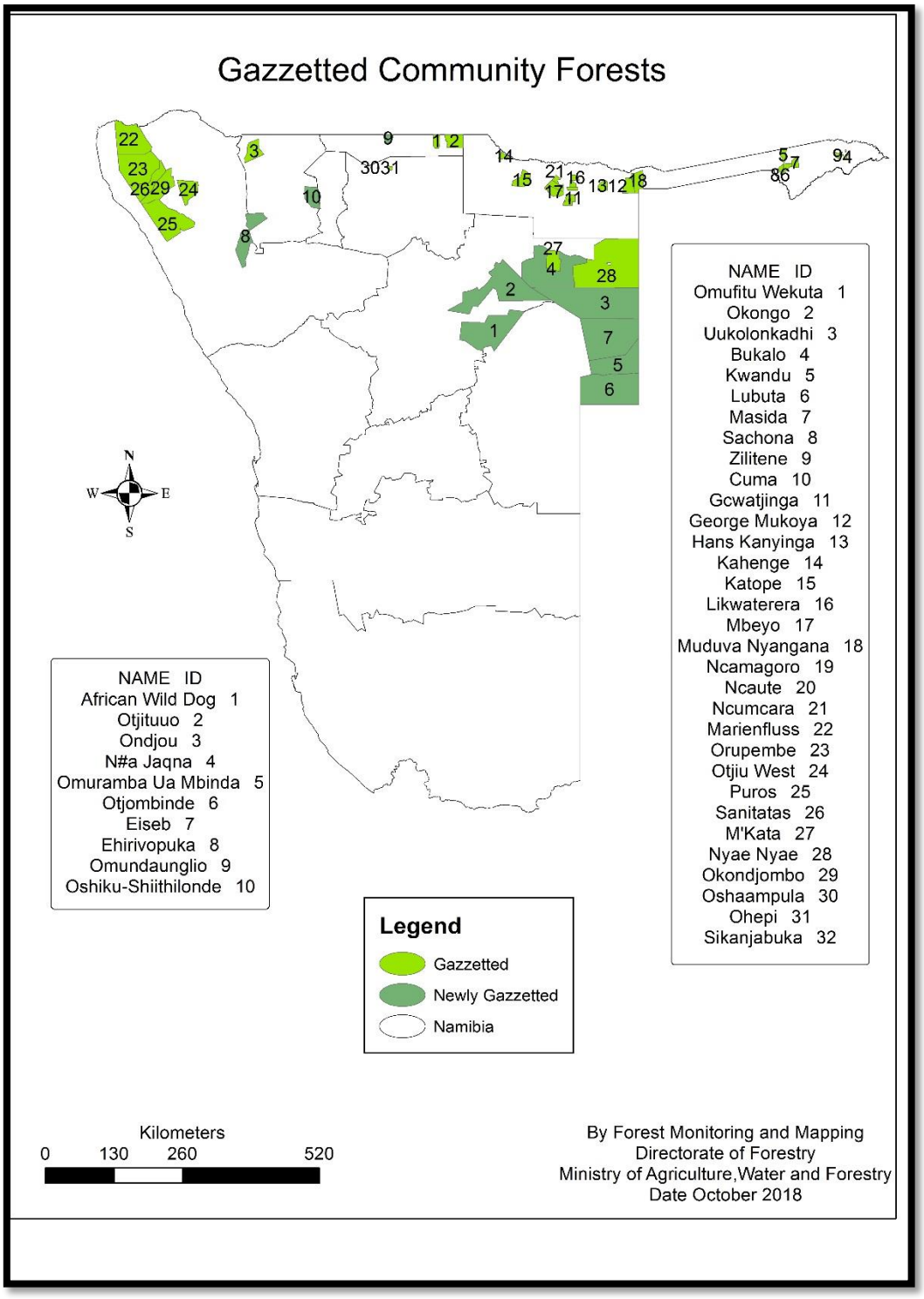

Figure 3.1: *Gazetted community forests in Namibia. (MAWF, 2018)*

Initially, the Namibian government enacted the Traditional Authority Act of 1995 that enabled traditional authorities to closely cooperate with communal communities and different organisations to ensure the sustainable management and utilisation of natural resources in the country. Human interferences cannot be ruled out as part of the factors that

lead to deforestation but, their management interventions through community forest initiatives are integral in preventing or mitigating the deterioration of natural systems and depletion of natural resources. The community forestry initiative is considered as a Clean Development Mechanism (CDM) which can be used as an important vehicle for fast-tracking the implementation of SFM, while improving the living conditions of rural poor communities (Minang *et al.*, 2007). To complement the community forestry initiative in preserving the natural forest resources, Betru *et al.*, (2019) advocate the need to enhance current local management practices by proposing and lobbying the promotion of sustainable technologies and wise land use practices that would minimise negative impacts on world forests. Nepstad (2014) agrees that deforestation can be reduced through enhancing and promoting suitable land use practices that may contribute to sustainable development.

However, even though rural communities endure the costs of issues like overgrazing and deforestation, these issues tend to minimise possible efforts of managing natural resources and also reduce people's benefits from natural resources (Byers, 1997). This issue could be attributed to weak policies in place, weak governance systems and corruption among the local community and at the national level. Mbidzo (2016) recommends several measures to overcome this, including, introducing comprehensive courses of action as a counter-acting measure to the challenges faced by communities to improve local governance over natural resources; promoting conservation programmes for instance, community forestry, a conservation initiative that promotes community involvement and ownership over natural resources; and appropriately reviewing laws and policies to increase the number of beneficiaries and promote equitable distribution of benefits among rural poor communities.

3.10. Chapter summary

This chapter provided a comprehensive review of literature relating to deforestation. It discussed forests as ecosystems and the major forest ecosystem types found around the world. It further discussed the immediate and underlying causes of deforestation and the consequences deforestation has on the livelihoods and cultures of indigenous communities. Finally, the chapter concluded by examining two measures commonly implemented in Namibia to sustainably manage forest ecosystems.

CHAPTER 4
Research Methodology

4.1. Introduction

This chapter presents the research design and methodology applied in the study. Research methodology is the systematic way of solving and overcoming the research problem or phenomenon under investigation, based on set research objectives (Leedy and Ormrod, 2005). The research methodology is a strategy that translates ontological and epistemological principles into a set of guidelines that show how the research was conducted (Tuli, 2010). This chapter discusses the research philosophy adopted, the research design and strategy employed for the study, study population and sampling method used to determine the study participants. The chapter also highlights the research instruments used to obtain primary information for this study. Data reliability and validity, ethical considerations, and the limitations of the study are part of the critical aspects emphasised in this chapter.

4.2. Research philosophy

Saunders *et al.,* (2009) describe research philosophy as a systematic belief and norms through which research knowledge is developed. In simple terms, research philosophy is a set of mutual beliefs and agreements used to understand the problem being investigated or studied, and how associated problems can be addressed accordingly. The ontological, epistemological and axiological thinking are common research philosophies applied in research studies to acquire knowledge of the specific subject matter (Creswell and Creswell, 2017). Ontology is simply defined in business research as the science of being. The epistemology of a study is more focused on how we know what we know, whereas axiology thinking is more focused on the values that go into knowledge claims (Creswell and Creswell, 2017). These research philosophies are categorised into objectivism, positivism, post-positivism, pragmatism, interpretivism, relativism and subjectivism research paradigms, among others. The adopted research philosophy determines the data collection procedure pertaining to the phenomenon being studied, including the analyses of data and the optimal use of information to draw logical discussions and conclusions.

This study employed a qualitative research strategy to collect, analyse and present the findings of this study, acknowledging the epistemological ground philosophy. Epistemological interpretive researchers believe that reality can only be understood through subjective interpretation and intervention in reality (Mackenzie and Knipe, 2006); hence, this study's approach to study the subject matter in its natural setting or environment. This research took into consideration the perceptions and subsequent actions of people in a social context (Saunders *et al.*, 2009: Creswell and Creswell, 2017). The ontological perspective was considered in view of a balanced and holistic outcome, acknowledging that most ecosystem structures and their functions may primarily be determined by human beliefs, interactions and behaviours. Petrosillo *et al*., (2015) deem it imperative to integrate socio-ecological systems comprised of both environmental and social sciences. This study is underpinned by human (social) relations with ecological (forest) systems.

Interpretivist studies have a general assumption that reality is not objectively determined, but rather socially constructed (Creswell and Creswell, 2017). The notable characteristic of this philosophy is that it values what people say, do and feel and further, also to create meaning of the phenomena being studied. Therefore, this approach enabled the researcher to develop patterns, themes and trends which emerged from the research data collection process.

4.3. Research design

Kothari (2004) defines research design as a strategic framework used to guide the collection and subsequent analysis of data in a way that integrates and closely conforms to the study's objectives. Generally, a research design outlines the plan, the structure and the strategy of investigation developed to address the problems of the research and to obtain answers or solutions to research questions (Kumar, 2019; Creswell, 2013). It outlined the type of data which was deemed relevant to the study and the adopted data analysis procedure (Leedy and Ormrod, 2005). The research design guided the researcher as it provided the blueprint on how the study was to be undertaken (Creswell, 2013). Creswell (2013) emphasised that the adopted research design of a study helps the researcher to answer research questions objectively and accurately.

Interpretivist researchers try to avoid rigid structural frameworks as opposed to positivist researchers who adopt and apply more flexible structures or frameworks for research.

Interpretivist researchers believe that the world is socially constructed, complex and ever-changing, compared to positivist studies which are typically entrenched on a fixed and measurable reality that is often independent of the study sample (Tuli, 2010). With an interpretive research paradigm, the researcher entered the field with a prior insight of the subject matter and the assumption that the known knowledge is insufficient to develop a fixed research design due to the complexity and unpredictability of nature. Hence, this paradigm enabled the researcher to obtain an advanced understanding of deforestation, as opposed to the approach of generalising findings for the entire study population. The structural frameworks applied for this study were more receptive in obtaining meaningful and interactive responses from the participants to generate sense from what was perceived to be the reality. The information gathered during the survey and focus group discussions was socially constructed rather than objectively determined. Different narrations were obtained during the researchers' interactions with the research participants, which further helped the researcher to understand the real world.

Additionally, this study also applied the case study approach, an approach commonly used to describe a study focused on an individual or a group of people. Zainal (2007) and Crowe *et al*., (2011) note that case studies enable an in-depth exploration on complex issues in real-life settings, and where a sampled number of units (people) are used as sources of evidence or primary data sources. The case study approach was found appropriate to distinctively investigate issues pertaining to determining the main causes of deforestation in the Otshiku-shiIthilonde Community Forest. By so doing, ultimately evaluate how the phenomenon impacts the livelihood and culture of communities within the community forest.

4.3.1. Qualitative method

The qualitative method underpinned the interpretive embedded research paradigm adopted for this study. Qualitative studies are based on interpretive narratives of the study participants which allow researchers to make inferences based on the participant's own perceptions (Tuli, 2010). Thus, qualitative studies are systems of inquiry which strive to build holistic, dominantly narrative and descriptive information, which inform the understanding of the researcher on social and cultural issues. The qualitative approach adopted seemed to obtain answers to questions on how the local communities (target

population) are influenced by events that are happening around them and what cultural practices are developed and employed to counteract the identified issue.

In comparison to quantitative studies which rely on finite questions and responses, qualitative studies commonly consists of open-ended questions on which researchers depend on for in-depth responses of the participants to have an advanced understanding of an issue (Jackson *et al.*, 2007). The research participants were largely in control and liable to the information obtained. However, one of the associated disadvantages of qualitative studies is that their outcomes are hardly generalised to the entire population because of the small sample size (Hancock *et al.*, 2001; Jackson *et al.*, 2007).

Qualitative studies require the use of methods that guide the researcher on identifying and accordingly framing the type of problem being investigated. It further determines how data is obtained, analysed and after that, drawing logical conclusions or inferences. Although the study employed a qualitative approach, the data collection tool (questionnaire) also consisted of coded quantitative data. However, qualitative information and interpretations dominated this study, as the information captured from the semi-structured questionnaire was complemented by information collected from the focus group discussion held with key-informants.

4.3.2. Method justification

The researcher adopted the qualitative method for the study because it provided the opportunity to understand extensive and multifaceted issues related to the impact of deforestation on local communities. The advantage of the qualitative research method is that it allows both verbal (i.e. interview responses) and non-verbal responses in the form of graphs and tables to be collected (Leedy and Ormrod, 2005). This method enabled the researcher to closely interact with the communities, through face-to face-interviews and a structured focus group discussion. Qualitative studies often make use of inductive reasoning, which, Sauce and Matzel (2017) describe as the logical process comprised of principles that are perceived to be true and used to draw logical conclusions.

The qualitative research technique is further justified by the fact that quantitative techniques often fail to obtain in-depth explanations of research subjects because they are mostly dominated by quantifiable outcomes. Quantitative studies mostly account for numerical data which are mostly preferred by policy-makers in making decisions. In

contrast, this study adopted the qualitative research techniques which implied obtaining descriptive and interpretive information from participants. However, Rahman (2017) reports that information obtained through qualitative studies are hesitantly preferred in decision and policy-making processes.

The data for this study was collected using face-to-face interview approach aided with a semi-structured questionnaire as the main data collection tool. A focus group discussion was conducted with key-informants in order to complement the data collected with the questionnaire. Both data collection techniques covered complex issues relating to the impacts of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde community forest. Qualitative studies rarely use numerical data, but integrating it with the quantitative technique in the research instrument allowed the researcher to obtain both assessable and in-depth descriptive information.

4.4. Study population

In most scientific studies, it is important to determine the research population on which the study is primarily focused on and to which findings obtained can be generalised based on the determined representative sample. In simple terms, a target population is a group of people to which the outcomes of the research may apply. Hanlon and Larget (2011) define a study population as a set of all individuals or units of interest. Blanche *et al.*, (2006) reiterate that these are units to which the research questions and findings may apply. The participatory rural appraisal report by MAWF (2014) revealed that there are seven established villages in the Otshiku-shiIthilonde Community Forest, with about 3 470 households.

The target population for this study was community members within the boundaries of the community forest, randomly sampled on the basis that they are main users and beneficiaries of the forest's resources in the defined boundaries. Complementarily, the Forest Management Body (FMB) members of Otshiku-shiIthilonde Community Forest and a Forestry Technician of the Ministry of Agriculture, Water and Forestry - Directorate of Forestry formed part of key-informants in the focus group discussion.

4.5. Sample and sampling

Hanlon and Larget, (2011) define a sample as the subset of individuals in a target population. A sample is a determined subgroup of individuals perceived to be

representative of the total target population on which the study is based on (Lopez and Whitehead, 2013). These are members of the study population from whom data or information for the study is obtained from. There are various kinds of sampling techniques, commonly categorised as probability and non-probability sampling. Every member within the study population had an equal chance of being selected to be part of the study sample when employing the random probability sampling method. However, the distinct probability of a person being selected to be part of a study sample was associated with the non-probability sampling technique

This study adopted a simple random sampling method. This method granted every community member within the target population an equal chance of being included in the sample (Kothari, 2004; Leedy and Ormrod, 2005). Otshiku-shiIthilonde Community Forest consists of seven established villages which comprise of approximately 3 470 households. The researcher could not obtain the exact number of households in each of the sampled village due to a lack of data availability, but it is worth mentioning that all the villages (Table 4.1) within OCF were fairly represented.

Table 4.1: *Villages surveyed for this study. (Author, 2019).*

Population of study area = 3 470 households	
Sampled villages	**Sample size**
Onkani	14
Ondjungulume	19
Efo-etalala	12
Onkaankaa	17
Uuvudhiya	16
Otjiwalunda	9
Engombe	11
Total sample size	**98**

Hanlon and Larget (2011) are of the view that larger samples are often more representative of the study population but, this study was delimited by the limited resources available and the timeframe within which the study was to be completed. Hence, these delimitations could not allow for evaluation of a larger sample size.

The purposeful sampling technique was applied in selecting the key informants for the focus group discussion. The purposeful sampling technique is used in qualitative studies with the purpose of identifying and selecting information-rich individuals for effective use of limited resources (Patton, 2002; Palinkas *et al.*, 2015). Therefore, the researcher purposefully selected seven key informants who formed part of the OCF management body, along with a forestry technician from the Ministry of Agriculture, Water and Forestry - Directorate of Forestry of the Engombe Forest Station.

4.6. Research instruments

There are different ways of collecting primary data for research studies. Kothari (2004) and Zohrabi (2013) list laboratory tests, interviews, surveys, questionnaires, focus group discussions and physical observations among the best methods that are used for collecting primary data in research. The data collection methods used in research studies are often determined by the selected research methodology (Leedy and Ormrod, 2005).

This research adopted the face-to-face interview method complemented with a semi-structured questionnaire as the main tool of gathering data for this research. Essentially, there are three common types of qualitative interviews, namely: structured, semi-structured and unstructured. Guided by a semi-structured questionnaire, this method enabled the researcher to interact with the research participants in evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest. Edwards and Holland (2013) are of the understanding that structured interviews are closely related to quantitative studies and often used in survey studies, whereas, semi-structured and unstructured interviews are common in qualitative studies. This method was more preferred due to its flexibility, and because it allowed the researcher to obtain rich in-depth information from the respondents pertaining to the study's objectives.

Additionally, a focus group discussion was conducted with key informants, which comprised of the management committee of the Otshiku-shiIthilonde Community Forest and a forestry technician from the Directorate of Forestry of the Ministry of Agriculture, Water and Forestry.

4.6.1. Semi-structured questionnaire

One-on-one interviews were guided by semi-structured questionnaires which formed the primary data source for this study. The researcher adopted the role of an interviewer. The questionnaire (Appendix II) consists of questions compiled in such a way that they guided the face-to-face interviews. One of the advantages of using a semi-structured questionnaire is its ability to obtain narrative information from respondents who form part of the study population (Lopez and Whitehead, 2013).

The questionnaire comprised of six distinct sections. The first section aimed to capture socio-demographic characteristics of the communities in OCF; the second section aimed to capture socio-economic information; the third section aimed to capture the causes of deforestation in the OCF. The impacts of deforestation both on livelihoods and culture were recorded in the fourth section of the questionnaire. The fifth section focused on obtaining information with regards to SFM; and lastly, section six entailed questions relating to cultural and indigenous knowledge systems applied to ensure the sustainability of the forest. The questionnaire was structured in such a way that all the research objectives and research questions were covered, as proposed by Lopez and Whitehead (2013).

4.6.2. Focus group discussion

Generally, focus group discussions serve as primary data sources, or as a supplementary source of data that forms part of a complex approach of collecting data (Jackson *et al.*, 2007; Dilshad and Latif, 2013). Focus group discussions are used in qualitative studies to obtain an in-depth understanding of social issues from purposely selected individuals (O.Nyumba *et al.*, 2018). There are multiple benefits associated with focus group discussions, including the ability of researchers to interact with participants on the subject matter, within a limited timeframe. However, focus group meetings are perceived as unusual social platforms (Ho, 2006) that can risk data reliability.

Nonetheless, the information obtained through face-to-face questionnaire interviews was supplemented by the information obtained from the focus group discussion held for the study. The researcher adopted the role of the lead facilitator in conducting the focus group discussion with the selected key-informants.

4.7. Data reliability and validity

Leedy and Ormrod (2005) define data validation as the measure or extent to which the data collection instrument used yields the same findings when repeatedly used. Data validity connotes how the data collection tool provides accurate and similar measures if repeatedly used for its intended purpose in order to produce constant, error-free and reliable study findings. In research sphere, data validity determines whether the findings of the research are authentic and trustworthy. Chakrabartty (2013) describes data reliability as the extent of consistency, accuracy, and the trustworthiness of a study, often based on the tool used to gather information. Shekhar (2014) indicates that both data validity and reliability improve the study's transparency and minimises the chance of biasness.

The questions compiled in the questionnaire were grouped according to themes in order to explore and measure similar variables. Prior to conducting the actual study, academic experts (Dr. Johannes Belle and Ms. Margaret Angula) were consulted to review and validate the data collection tool. A pilot survey was conducted with a small group of the target population to evaluate the validity reliability of the questionnaire. This was vital in helping the researcher detect and sift out errors that might have been subconsciously included in the questionnaire. It also enabled the researcher to correct any weakness and inconsistency in the questionnaire before carrying out the actual study. Most importantly, the questionnaire was translated into the local vernacular (Oshiwambo) to ensure that the data collectors and research participants comprehensively understood them. Input from various experts validated the data collection tool. Triangulation played a critical role because the face-to-face interviews guided by a semi-structured questionnaire and the focus group discussion conducted helped to obtain diverse viewpoints with regards to the effects of deforestation on the livelihoods and culture of the study population. The validity and reliability of the data positively influenced the outcomes of the study and enabled the researcher to make valuable inferences (Leedy and Ormrod, 2005).

4.8. Ethical consideration

The notion of considering ethical issues in research cannot be over-emphasised (Rahman, 2017). This study applied the basic principles of conducting research. Honesty is among the key principles that was considered, applied and maintained throughout the study process. Professionalism was another key principle of ensuring a smooth completion of this study. The information collected was treated with total discretion.

The following guidelines were provided to the research participants prior to participating in this study:

a) *Consent* – Firstly, the researcher requested for permission to conduct the research in Otshiku-shiIthilonde Community Forest from the relevant authorities, the Ministry of Agriculture, Water and Forestry (Directorate of Forestry) and the FMB. They are mandated to oversee and implement community forestry activities in the area. Additionally, the participants were asked for their consent to participate in the study, prior to the interviews. The objectives of the study, including the methodology and the study procedures, were clearly explained to the authorities and research participants prior to obtaining their consent. This was in accordance to the prerequisite as stipulated in the Belmont Report when requesting consent (Department of Health, 2014).
b) *Voluntary participation* - The participants in this study had the right to accept or reject to take part in this study. Those who agreed to partake in the study were requested to sign a consent register in confirmation of individual willingness to partake. This guideline was exercised following the Helsinki Accord of 1975 which recognises the respect of individual autonomy to partake in a study and the need for consent as part of research ethics (Rose, 2009).
c) *Anonymity* - All the information collected and the outcomes of this study were treated on condition of anonymity, and used for academic purpose only.

4.9. Data analysis and presentation

The most important step in researcher after collecting data is to conduct an analysis. It is regarded as the central step in qualitative research (Flick, 2013). There are different qualitative data analysis techniques, including among others, content analysis, narrative analysis, discourse analysis, thematic analysis, framework analysis and grounded theory analysis (Flick, 2013; Michael, 2018). The thematic data analysis technique was specifically used in this study. The analysis technique was used to systematically identify, organise and offer insight into theme patterns across the dataset (Joffe and Yardley, 2004; Braun and Clarke, 2006). This technique involved examining and identifying themes and patterns to generate sense from data collected with the semi-structured questionnaire and focus group discussion.

In addition, the identified themes were conceptualised into patterns of shared meaning across the data items and made it easier for the researcher to understand the subject matter

and to appropriately align it to the research questions. Data cleaning was done to overcome any form of errors that may have been recorded. The data was coded and entered into a Microsoft Excel spreadsheet for analysis. Coding helped the researcher to reduce the data into small chunks of meaningful and manageable information. An inductive approach was applied to link the identified themes to the data collected through the use of a semi-structured questionnaire and focus group discussion, as used by Maguire and Delahunt, (2017). Summarising the mass collected data made it suitable for presentation in such a way that all essential features of the study were communicated.

The analysed and processed data were presented in the form of charts and tables in Chapter 5 of this research. The interpretations of the results were made based on key findings and narrative responses obtained during the data collection processes, which contrasts with information obtained from literature reviewed.

4.10. Limitations

Study limitations are the defects of methods and concepts identified by the researcher which may have affected the outcomes of the study. The researcher encountered several shortcomings, including time constraints and limited resources. On this basis, the researcher has the assumption that the findings of this study could have been more comprehensive should the study duration have been extended and adequate resources available.

Another limitation was the low willingness of community members of the target population to participate in the study. The participants rather wanted to know the immediate impact the study would make on the lives and livelihoods of the community, while several respondents were of the view that the study was politically affiliated, as 2019 was a year of elections. Most probably, the political linkage of the study could be due to the fact that the Otshiku-shiIthilonde Community Forest is situated between two political regions, Oshana and Omusati Region. Some community members in the target population refused to participate in the study due to the apparent inadequacy of service delivery from the government. This is especially with regards to drought relief. In order to overcome this limitation, the researcher informed the Constituency Councillors of both Uuvudhiya (Oshana region) and Otamanzi (Omusati region) constituencies to announce the intention of the study on the Namibian Broadcasting Corporation (NBC) Oshiwambo radio service.

The radio announcement was repeatedly done throughout the data collection period. The researcher succeeded in interviewing 98 community members within the OCF.

Due to time constraints and limited resources, the study could not be expanded to include the communities living on the outside peripheries of the community forest boundaries. These communities might equally derive benefits from the Otshiku-shiIthilonde Community Forest.

4.11. Chapter summary

This chapter focused on the methodology deployed by this study. It also explained the study philosophy, research design, the study population and sampling method used. The limitations encountered during the study duration and the remedies taken were also highlighted. The following chapter presents the analysed data and key findings of the study.

CHAPTER 5

Data analysis and presentation

5.1. Introduction

The previous chapter presented the research design and the methods that were used to collect primary data for this study. This chapter provides an analysis of the data collected through field work and also presents the findings. The analysis comprised data obtained from face-to face-interviews guided by a semi-structured questionnaire and from key informants who formed part of the focus group discussion. This chapter also covers among others, the socio-demographic information; socio-economic information of the participants; factors of deforestation in Otshiku-shiIthilonde Community Forest; the impacts of deforestation on the livelihoods and cultures of local communities; forest management; and the indigenous knowledge systems applied to ensure the sustainable use of the forest.

5.2. Socio-demographic and socio-economic characteristics

This section of the chapter presents the demographic and socio-economic characteristics of the respondents (*n=98*) who were successfully interviewed during the field survey. These data include age and gender ratio of the respondents, their duration of residency in Otshiku-shiIthilonde Community Forest, livelihood sources and how they perceive the value of forests.

Igwe (2016) mentions that the increasing effects of deforestation on socio-economic practices of indigenous communities across the globe is a huge challenge towards sustainable development. Although this information may not be addressing the main objective of the study, it presents valuable information that complements the overall findings for the study and possibly could be used as reference for future research studies and possible decision-making.

5.2.1. Age and gender segregation of respondents

The respondent's ages ranged from 16 to 46 years and above. An equal age distribution of respondents (37%) was recorded for 36 to less than 45; and 46 and above age groups. Among the research participants, majority of the respondents were above the age of 36, while the youth respondents garnered a combined total of 26%. This clearly depicts that senior people were more eager to participate in the study, compared to the youth. It could

be that the youth have moved to urban areas in search for better education and employment.

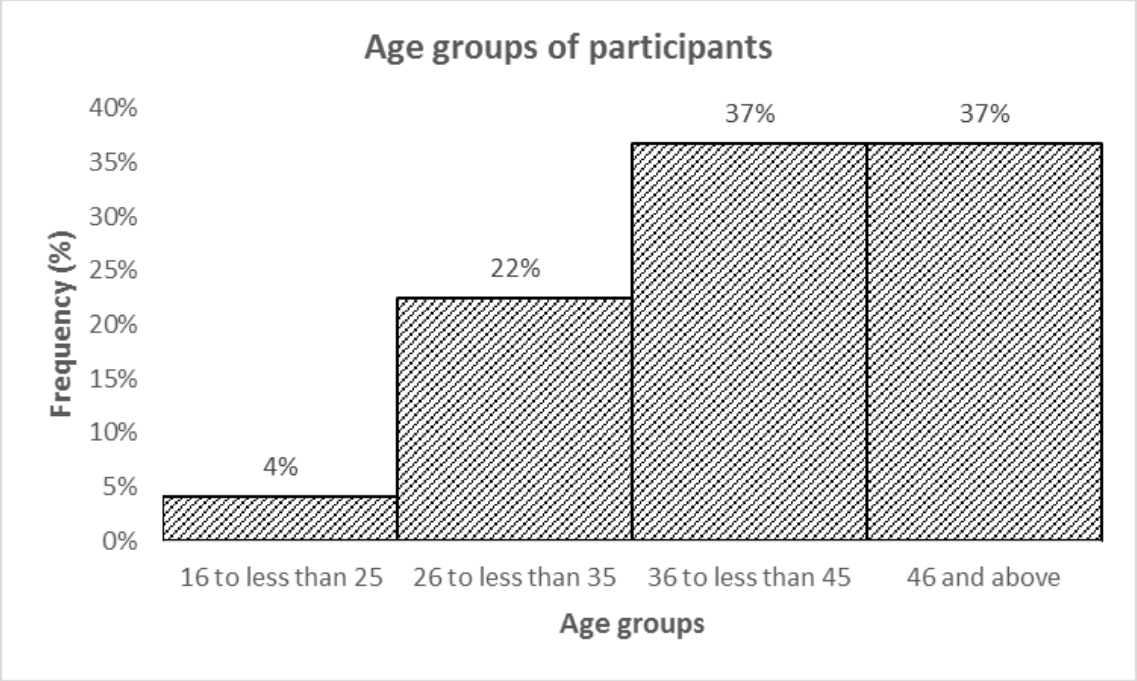

Figure 5.1: *Age distribution of respondents. (Author, 2019).*

Just over half of the respondents sampled (55%) were males, while forty five per cent (45%) were females. This may indicate a slight margin of willingness among both gender groups in participating in scientific studies that are conducted in their respective areas, in this case, sharing their perceptions on how deforestation impacts their livelihoods and culture. However, their participation in this regard could not be used to identify or determine the gender group that contributes more to deforestation in Otshiku-shiIthilonde Community Forest.

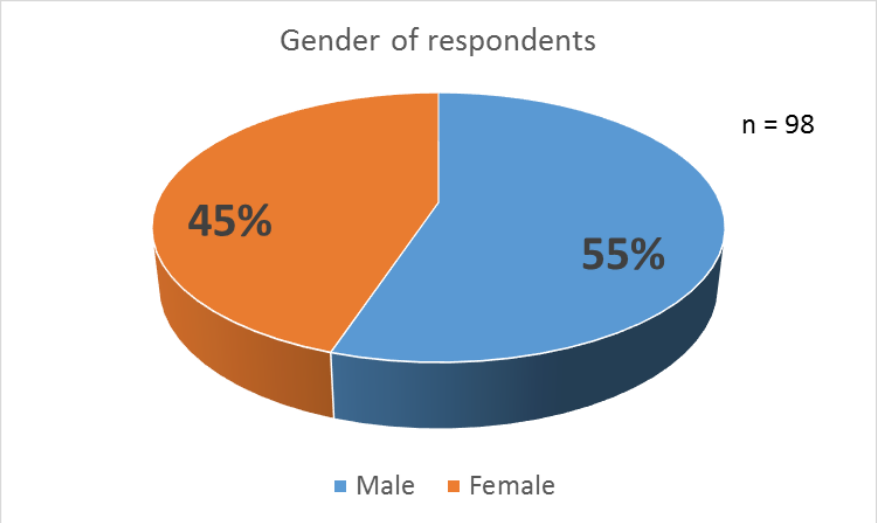

Figure 5.2: *Gender distribution of respondents. (Author, 2019)*

5.2.2. Duration of residence in Otshiku-shiIthilonde Community Forest

The duration which the community members have lived in their respective villages could be used to determine the amount of knowledge possessed by the local people about the environment. Such information can also be used to measure the extent of changes and transitions that may have been observed in the environment.

The period of residency for this particular study was distributed from below 1 year to more than 20 years.

Table 5.1: *Duration of residence of respondents in OCF. (Author, 2019).*

Residence duration	**Number of respondents**
< 1 year	2%
2 to 5 years	14%
6 to 10 years	14%
11 to 20 years	23%
More than 20 years	47%
Total	**100%**

The survey outcomes revealed that majority of the respondents had lived in Otshiku-shiIthilonde Community Forest for more than 2 years and above. About forty seven per cent (47%) of the respondents had lived within the community forest for over 20 years. An equal distribution of 14% respondents was recorded among the 2 to 5 years and 6 to 10

years categories. However, 2% of the respondents interviewed stated that they lived in OCF for less than a year.

5.2.3. Farming activities

As shown in Table 5.2, twenty eight per cent (28%) of the respondents indicated that they regard crop farming/production as an important livelihood practice, whereas only three per cent (3%) of the respondents regarded livestock farming as important. Based on physical observations, small-scale dry crop production and cattle rearing are the most common systems practiced in Otshiku-shiIthilonde Community Forest. Sixty nine per cent (69%) of the respondents indicated that both crop and livestock farming are both important livelihood practices. The two farming practices are common farming methods which the communities practice mainly during the rainy season between November and April.

Table 5.2: *Importance of agricultural/indigenous activities to local communities. (Author, 2019).*

Farming activity	**Percentage (%)**
Crop farming	28%
Livestock farming	3%
Both practices	69%
Total	**100%**

The results clearly show the undisputed value of these agricultural practices to rural communities in meeting their household demands and sustaining their livelihoods. Baiphethi and Jacobs (2009) assert that subsistence agriculture is an essential practice for reducing vulnerability of rural households through enhancing their livelihoods, while also mitigating the effect of high inflated food prices. It has been noted that some of the crop and livestock farmers are able to sell surplus productions in the local markets for an income.

5.2.4. The value of forests to communities of OCF

African rural populations traditionally rely on forests as they provide livelihood maintenance goods such as food, wood for energy, medicinal herbs, animal feed, as well as building materials (Barrow *et al.*, 2016). From an environmental perspective, forests are also important for the well-being of the environment and biodiversity because they provide air, animal habitats, climate regulation services and shelter.

The survey results revealed that a number of respondents strongly agreed (49%) and just agreed (47%) with the statement that forests are valuable natural systems. For poor rural communities, having free access and utilisation rights over forests and their resources is very important especially during dry and stressful periods (Barrow *et al.*, 2016). Nikodemus and Hájek (2015) note that the day-to-day livelihoods of approximately 90% of communities living in rural areas depend on natural forest resources, hence, they are often considered as safety nets for poor communities in rural settings. However, a representation of two per cent (2%) of the respondents disagreed with the statement that forest resources are valuable, while a mere one per cent (1%) strongly disagreed with the statement.

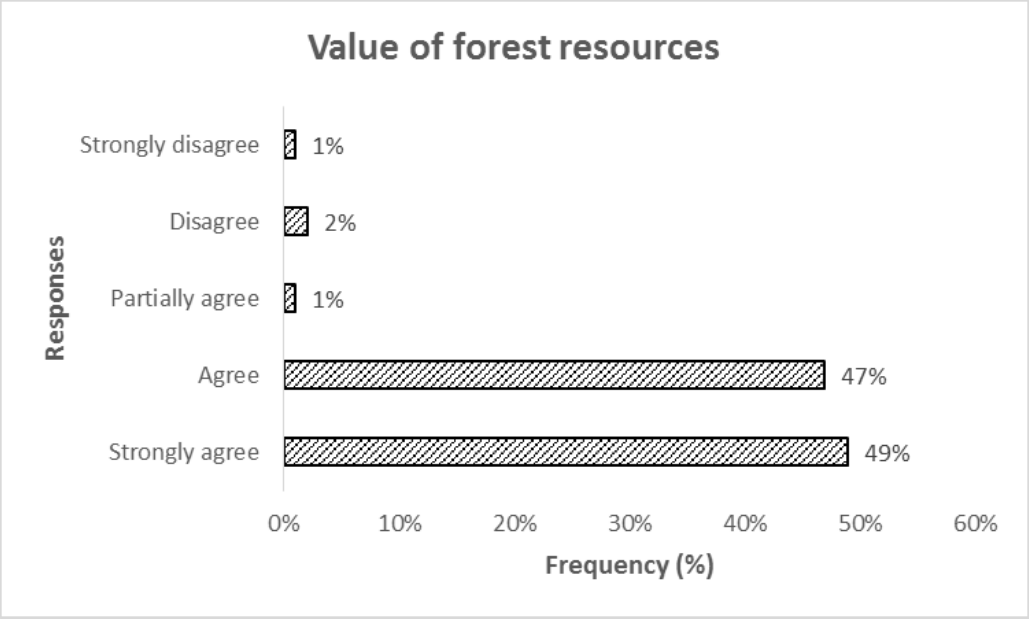

Figure 5.3: *Value of forest resources to communities. (Author, 2019)*

The respondents were asked to rank forest resources in accordance to their value, with 1 being the most important and 5 as the least important. The respondents were provided with guiding forest resources and benefits that can be derived from the forest, including firewood, medicines, food (berries, mopane, etc.), raw building materials, and economic benefits.

The survey revealed that, majority of the survey respondents (38%) regarded firewood as the most important resource derived from the forest. Basically, firewood is an everyday product used for various household chores like cooking food, heating water and also as a source of light. This resonates with the findings of Eba'a *et al.,* (2016) who report that about 80% of energy in most Africa countries is derived from woody resources.

Table 5.3: *Ratings of forest resources. (Author, 2019).*

RESOURCES	RATINGS				
	1	**2**	**3**	**4**	**5**
Firewood	38%	32%	17%	12%	1%
Medicines	7%	8%	31%	33%	21%
Food e.g. berries, mopane worms	27%	29%	19%	20%	4%
Raw building materials	23%	27%	24%	19%	7%
Economic benefit	5%	5%	8%	15%	66%
Total	100%	100%	100%	100%	100%

Factors such as the limited availability of alternative energy options in the form of electricity, solar energy, etc., and the increasing poverty levels in rural areas are some of the contributing factors to the increased reliance of rural communities on wood for energy. Thirty eight per cent (38%) of the respondents ranked firewood as the most usable and important forest resource; 27% of the respondents ranked food (berries and mopane worms) as important for their livelihoods; and raw building materials obtained preference from 23% of the respondents. Based on the physical observation done, most traditional homesteads in the NCN are mostly constructed with tree logs obtained from forests, although there are some households adopting the use of alternative building materials. Furthermore, 5% of the respondents indicated that the economic benefits obtained from selling forest products in local markets are vital sources of livelihood. Contrarily, 66% of the respondents indicated that they do not get any economic benefits from forest resources, hence the highest percentage in the fifth rating category.

5.2.5. Alternative livelihood sources

This study also aimed to determine the sources of livelihoods and their importance to the people in Otshiku-shiIthilonde Community Forest. Of the interviewed respondents, 49% of them indicated that they have alternative livelihood sources, apart from being reliant on the forest resources for their livelihoods. Twenty eight per cent (28%) of the respondents stated that they or their household members administrate small to medium local businesses for an income, while 10% of the respondents engage in work at home opportunities as an alternative source of livelihood. The seasonal or occassional work for hire opportunities

(4%) and freelancing in respective fields of expertise (4%) were among the less common alternative livelihood sources reported by the respondents.

Fifty one per cent (51%) of the respondents indicated that neither they, nor their household members have alternative livelihood sources, but only rely on the forest resources for their livelihood. This can be interrelated to the social state and economic status of households who may be finding it difficult to secure alternative income sources to complement their well-being.

5.3. Deforestation

This study helped to determine the awareness level of the people in Otshiku-shiIthilonde Community Forest with regards to deforestation. Ninety two per cent (92%) of the respondents indicated that they know and have heard of the deforestation concept. Wekesa (2017) reports that awareness of communities plays an integral role on their participation towards the management and conservation of the forest. He further elaborates that it is imperative to raise awareness among communities in order for them to have a clear understanding on why there is a need to take part in forest conservation and management programmes.

Table 1.4: *Respondents' awareness of deforestation. (Author, 2019).*

Responses	**Percentage**
Yes	92%
No	8%
Total	**100%**

While there was a slight correspondence on the definition about deforestation as defined by the respondents, a number of the respondents aligned the concept to the destruction of both wildlife and natural plants. However, a correlation of the definition of deforestation emerged to the cutting down of trees at uncontrollable rates using various techniques and tools (axe, machete) for local use, without any intention of re-establishing the trees stand. This definition to some extent concurs with that of Igwe (2016) who defines deforestation as the continuous practice of conversion and reduction of tree cover, normally below the threshold of 10% as a result of natural or human-induced factors.

However, 8% of the respondents indicated that, they neither know anything about deforestation, nor have they even heard of what the concept entails.

5.3.1. Factors of deforestation in Otshiku-shiIthilonde Community Forest

The survey participants were asked for their opinions by selecting and ranking factors that are presumed as among the causes of deforestation in OCF. From a scale of one to five, with one (1) being the high perceived factor of deforestation and five (5) being the lowest factor, 34% of the respondents viewed poverty as the main factor of deforestation within the community forest. This could be attributed to the lack of employment and inadequate livelihood diversity in the community forest. Twenty three per cent (23%) of the respondents ranked the relatively high demand of woody resources like firewood and poles as one of the main factors of deforestation.

Rural people depend on forest wood for energy, while they also use tree logs to construct traditional homesteads. Nineteen per cent (19%) of the respondents ranked natural factors like veld fires, among the common factors of deforestation. In most instances, veld fires occur naturally by factors such as lightning but, humans are also liable for causing wildfires (Chinamatira *et al.*, 2016). When not controlled and occur frequently, veld fires destroy tree covers and reduce population density and may lead to deforestation. An equal distribution of 8% of respondents was recorded who are of the view that both ignorance and the clearing of forests to establish crop fields and rangelands are among the common factors of deforestation. The unawareness of some community members could be influenced and linked to their lack of interest to participate in local natural resource management initiatives because of not obtaining any benefit from forest resources.

In the second ranking category, 31% of the respondents indicated that high demand for natural resources is the common factor of deforestation in OCF. This resonates with the explanation eluded earlier that, forests are more pressurised by rural communities due to the high demand of forest products such as poles and firewood. The clearing of land for crop fields and rangelands ranked second highest in this ranking category by 23% of the respondents.

Literature shows that both crop and livestock farmers are among the common agents of deforestation (Brown and Schreckenberg, 1998; Borrego and Skutsch, 2019). For example, crop farmers mostly practice the slash and burn method in order to clear the land for

establishing new crop fields or expanding existing crop fields and rangelands for their livestock. On the other hand, natural factor (fires) was ranked by 16% of the respondents, in the second category of factors of deforestation in OCF. Both poverty and ignorance as factors of deforestation obtained an equal listing by 8% of the respondents.

Besides these factors, one respondent expressed that the formation of new settlements and expansion of towns is one of the factors of deforestation, and thus ranked it in the second ranking category. The respondent explained that as nearby towns expanded due to new developments, people who settled on the outskirts of the towns are relocated or duly forced to move. These people tend to move to communal/rural areas in search of sufficient land for establishing homesteads and crop fields. This often results in uncontrolled cutting down of trees, in turn accelerating deforestation in those specific areas (villages). This effect easily influences the set-up and influx of people into neighbouring villages or settlements because more people will be attracted by the new developments being established.

Table 5.5: *Ratings of deforestation factors. (Author, 2019).*

Factors of deforestation	**RANKINGS**				
	1	**2**	**3**	**4**	**5**
Lack of capacity	6%	13%	17%	18%	24%
Poverty	34%	8%	14%	20%	18%
Ignorance	8%	8%	14%	18%	16%
Clearing land for crop fields and rangelands	8%	23%	22%	8%	20%
High demand for natural resources (firewood, poles, etc.)	23%	31%	16%	17%	5%
Natural factors	19%	16%	19%	20%	18%
Other causes		1%			
Total	**100%**	**100%**	**100%**	**100%**	**100%**

The aspect of identifying the factors of deforestation is important as it would inform the primary objective of this study. For the purpose of this study, in order to determine the respondents' degree of agreement with a set of provided factors of deforestation in OCF, the researcher used a Likert scale of 1 to 5, with 1 being the highest factor and 5 the lowest perceived factor of deforestation. The survey results reveal that respondents (34%, n=33) expressed that poverty is the main cause of deforestation in OCF. Modh (2009) supports that high rates of poverty often influence people to engage in income-generating activities like farming and deforestation in marginal areas for their survival. The poverty factor was followed by the high demand of natural resources, such as firewood and poles (23%,

n=23); and natural factors (19%, n=19) like wild fires were preferred among rank 1 of the highest factors of deforestation. Ironically, 1% of the respondents expressed the establishment and expansion of towns (ranked in the second rank category) as a notable contributing factor of deforestation. The prominent towns nearby Otshiku-shiIthilonde Community Forest are Oshakati, Ongwediva (Oshana region) and Okahao (Omusati region). As these towns expand to accommodate new developments of various kinds, the municipalities are forced to consider acquiring the land on the verges or outskirts of the actual boundaries of the towns by buying the land from people who had already established homesteads. These relocated people mostly opt to go look for suitable lands far away from the towns (in the forests) where they can continue with subsistence crop and livestock farming activities.

On the other hand, 24% of the respondents ranked the lack of capacity (limited knowledge) as the least causal factor of deforestation in Otshiku-shiIthilonde Community Forest. Additionally, the respondents are of the perception that clearing the land for crop fields and rangelands (20%); poverty (18%); natural factors (18%); ignorance (16%); and the high demand of natural resources (5%) are least contributing factors of deforestation in the Otshiku-shiIthilonde Community Forest.

5.3.2. Impact of agricultural activities on the forest

Otshiku-shiIthilonde Community Forest is situated in North-Central Namibia, where agricultural activities are common practices. Subsistence farming activities can play an important role in lessening the vulnerability of rural communities subsequently enhancing livelihoods. In most instances, rural households find the need to increase the productivity of these agricultural activities to ensure food security. Rural households adopt the tendency of expanding existing crop fields and rangelands and establishing new crop fields in order to ensure food security. These practices essentially reduce the dependency of rural households on buying food from shops in the face of inflated food prices (Baiphethi and Jacobs, 2009). Therefore, this research deemed it important to establish the sort of impact which agricultural activities have on the state, structure and composition of the forest.

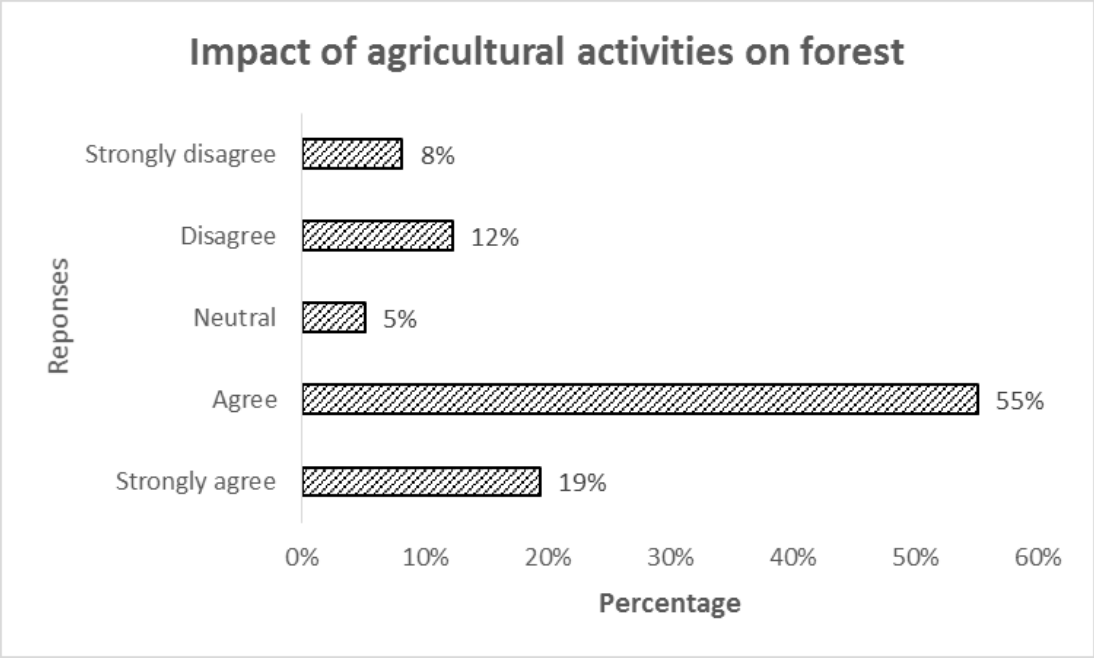

Figure 5.4: *Impact of agricultural activities on the forest. (Author, 2019).*

Majority of the respondents (55%) agreed with the statement that agricultural activities have a negative impact on the forest, while 19% of the respondents strongly agreed. With subsistence crop and livestock production being the main practiced agricultural activities for sustaining livelihoods, the participants acknowledge that the continued unsustainable use of the land would remain a challenge to the forest structure. Ironically, 8% of the respondents strongly disagreed with the statement, while 5% of the respondents were neutral with the statement that agricultural activities have a negative impact on the forest.

5.4. The impacts of deforestation

The overall objective of this study was to evaluate the impact of deforestation on the livelihood and culture of communities in Otshiku-shiIthilonde Community Forest. Deforestation is a form of land degradation that affects the productivity of the land and culminates into manifold effects that have adverse effects on people whose livelihoods are mainly dependent on natural resources. The livelihoods of poor rural households are mostly affected by this phenomenon with negative consequences mainly affecting developing countries (Beyene, 2011). A livelihood comprises the capabilities, assets (including material, human, physical, financial, natural and social resources) and activities required by individuals or societies for a means of living.

During the survey, the researcher aimed to determine if there were any significant changes which the target population had observed at present on the structure and composition of Otshiku-shiIthilonde Community Forest in comparison to past years.

Table 5.6: *Perceptions on the widespread of Otshiku-shiIthilonde Community Forest. (Author, 2019)*

Responses	Percentage
Strongly agree	37%
Agree	45%
Partially agree	8%
Strongly disagree	10%
Total	**100%**

Most of the respondents in OCF agreed (45%) or strongly agreed (37%) that the community forest was more widespread 5 years ago when comparing it to the current state. This can be used as evidence that the forest is being used unsustainably and that deforestation is taking place in the community forest. The survey results revealed that the communities perceive less value of natural resources in terms of economic benefits, besides the fact that they highly regard firewood as very important (Table 5.3). As indicated in above sections, there are various factors, both direct and indirect that can lead to deforestation. As for Otshiku-shiIthilonde Community Forest, poverty and the high demand for natural resources are perceived as the most prominent factors. With regards to the various definitions of deforestation provided by the respondents, it emerged that there is controlled and relatively limited access to forest resources by the local people. The communities, especially women now have to walk long distances to fetch fire wood and other important forest resources for their livelihoods.

5.4.1. Impact of deforestation on communities' livelihoods

The survey findings revealed that 90% of the respondents were impacted by deforestation in contrast to 10% who indicated that their livelihoods were not negatively impacted by deforestation. When asked to emphasise on how their livelihoods were impacted, the respondents expressed that their livestock were dying due to the lack of grazing. The lack of grazing was caused by reduced rainfall that recently has been experienced and also as a

result of erosion. Trees and grass cover play a pivotal role in mitigating soil erosion caused by heavy winds or excessive water run-off and floods.

Some of the respondents further reported that grazing had become limited in their respective villages and livestock had to walk long distances in search for feed. Additionally, the respondents also indicated that the shelter for their livestock was being reduced by deforestation. These sentiments were also shared by some key informants during the focus group discussion. A participant highlighted that grass and crop seeds were easily blown away by wind and water run-offs as a result of deforestation and misappropriate land use and management. Another participant explained that, grass seeds were blown away because trees that were supposed to mitigate the effect of wind on crops and vegetation were felled. The participant noted that during good rains, rapid water run-off effects led to crop failure and resultantly had a negative impact on the livelihood of communities. In support of this sentiment, one of the participants also noted that, the lack of trees results in reduced rainfall because trees play a key role in rainfall formation and temperature regulation.

Table 5.7: *Impact of deforestation on communities' livelihoods. (Author, 2019).*

Responses	**Percentage**
Yes	90%
No	10%
Total	**100%**

The respondents reported that they continue observing changes in rainfall patterns attributed to the effect of deforestation. The respondents also noted that changes in rainfall patterns resulted in recurrent droughts in their areas and also reduced rangelands for livestock. This resonates with Bettencourt *et al*., (2015) who report that, livestock play an essential role in uplifting local economies and the socio-cultural well-being of rural communities. Livestock are vital sources of food, income, soil fertility and overall livelihoods to rural households. Hence, drought (re)occurrences also negatively impact the livelihoods of rural communities who depend on rain-fed crops for food and income. The respondents further indicated that the decrease in rainfall availability could severely affect the rural communities by causing declines in crop harvests, and increasing livestock mortalities in Otshiku-shiIthilonde Community Forest and other affected areas.

As shown in Table 5.3, majority of the respondents regard firewood as an essential forest resource. However, the respondents were also worried that should deforestation continue to persist, there will be low availability of fuel wood in the near future and this will have a negative effect on their livelihoods. The respondents reported that they currently have to walk long distances, searching for firewood and other household products of importance from the forest. One of the FGD participants echoed that deforestation has an economic impact on their livelihoods because the community members depend on the woody forest resources for carvings that they sell in the local markets for a living. It is based on this background that, increased deforestation would result in reduced local income and reduced employment opportunities that have an effect on the well-being of the community.

The respondents also specified that deforestation had an adverse impact which could mainly be inflicted on poor rural communities who depend on natural plants from the forest to treat various illnesses. According to the respondents, medicinal plants like the devil's claws have become very rare and are hardly found in close proximity of rural field houses, compared to past years. This could negatively impact the health and general well-being of the indigenous communities.

The respondents referred to the current drought that has resulted in reduced crop harvests and high livestock mortalities as one of the effects of climate change, a consequence of deforestation.

The significance of trees in maintaining healthy environments and ecosystems cannot be over-emphasised. Trees not only absorb harmful gases and in return provide oxygen into the atmosphere, but also help regulate temperatures and are important habitats for wild animals, among other services. For example, the respondents narrated that they no longer have regular access to forest resources such as mopane worms. The respondents argued that most wild animals have migrated further and are not easily accessed as before in previous years due to destroyed habitats.

5.4.2. Impact of deforestation on the culture of communities in Otshiku-shiIthilonde Community forest

The survey revealed that, sixty seven per cent (67%) of the respondents' indicated that their culture was negatively impacted by deforestation while, thirty three per cent (33%) of the respondents reported that they were not culturally impacted by deforestation.

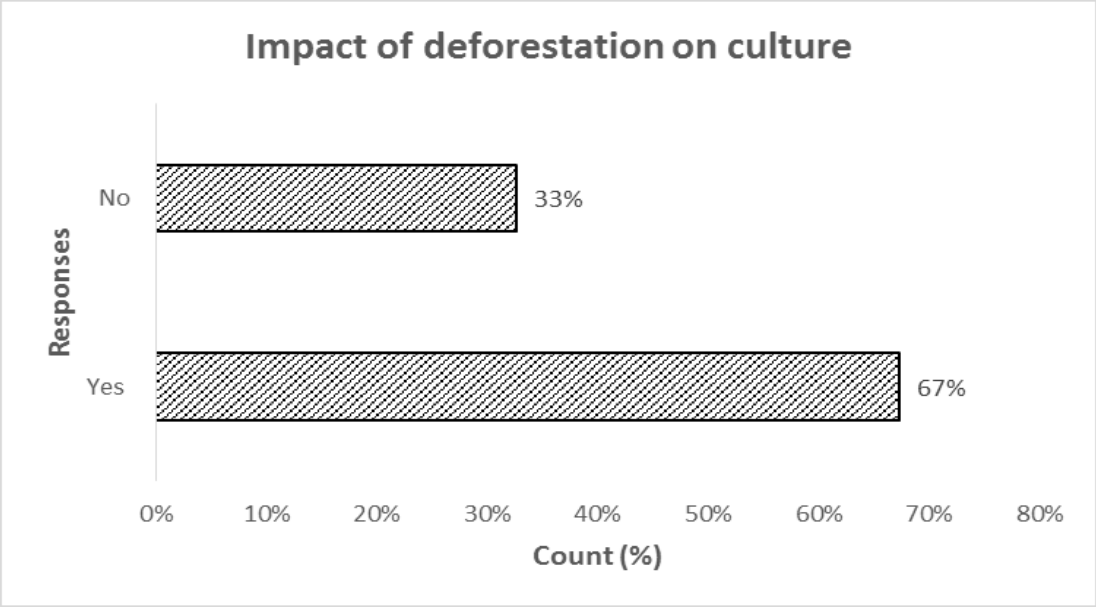

Figure 5.5: *Impact of deforestation on culture of communities in OCF. (Author, 2019).*

Forests are suitable habitats for a variety of domestic and wild animals, some of which are classified as endangered species (Tanyanyiwa and Chikwanha, 2011). When asked to elaborate on how the communities' culture was impacted by deforestation, the respondents emphasised the value of wildlife to their culture. The local communities regard wild animals as an important source of food and equally place high cultural value on wild animals' skins. According to the respondents, the wildlife skins are mostly used to make traditional attires. On the other hand, the respondents also reported that deforestation and the flocking of new people (mostly outsiders) into the forest have forced wild animals to move further away from human settlements. For instance, forest products like mopane worms became less available compared to previous years. Mopane worms are considered as important traditional food. Although mopane worms are seasonal, the respondents believe that their availability have been affected by deforestation and relatively poor rainfalls.

Besides the importance of maintaining social cohesion, several respondents raised concerns on the impact made by community members, normally those who come from outside the community forest area who invade their areas in search of land for crops and livestock grazing. The increasing demand of land for both crop production and livestock farming is mostly done illegally and without informed consent from the relevant traditional authority in consultation with the villagers. The respondents revealed that most outsiders migrate into their villages and secure large portions of the land which they clear and fence, but

often left unutilised. Concerns were raised by the respondents in the sense that future generations might not be able to obtain maximum benefits from natural forests and their cultural value might be adjusted if necessary measures are not implemented to reduce environmental degradation. The survey responses showed that medicinal plants like the devils' claw (*Harpagophytum*) were commonly available in the forest and used for traditional treatment of high blood pressure, but they have observed a significant reduction in its availability which they believe is a result of deforestation.

As mentioned in the preceding section, majority of rural communities in Otshiku-shiIthilonde Community Forest practice both crop and livestock farming on a subsistence basis. The respondents reported that agricultural activities have a cultural value among the communities because they are commonly practiced for household livelihoods. However, these cultural perceived practices are negatively influenced by the lack or low rainfall received in the area. The survey respondents attribute the low rainfall to deforestation which has resulted in devastating effects on the livelihood of the rural communities. Mbathera (2019) observes that Namibia has encountered a succession of drought periods since 2013 and these have resulted in severely reduced agricultural outputs. Drought left subsistence farmers with little or no food, a situation which compelled the President of the Republic of Namibia, His Excellency Dr. Hage Gottfried Geingob, to declare a state of emergency (disaster) on account of the drought experienced in 2019.

The respondents reported that trees, especially prominent *Acacia spp*. and *Terminalia spp*., are of cultural importance because of their strategic location within the community forest because they are preferably used to locate important places of interest in the forest. The respondents further elaborated that the trees are sometimes conferred as local shrines, while some of the trees are used for superstitions and traditional/cultural beliefs like predicting or prophesying local climate conditions and outlooks. However, the participants in the focus group discussion reported that there is increasing evidence of change in the composition of the forest in OCF with a loss of these culturally valuable trees.

The survey respondents also narrated that tree logs are culturally used to construct traditional homesteads, livestock kraals, fences or yards. These usages are commonly practiced by the poor rural community households. The respondents reasoned that the effect of deforestation results in traditional homesteads left exposed. The respondents also indicated that exposed homesteads are mainly common among elderly people's households

in the community forest who have limited financial resources and human capacity to access forest resources. Hence, the respondents stated that their ways of living are increasingly being affected in a negative way by deforestation. They are now forced to adopt new ways of constructing their homesteads using modern materials, doing away with traditional set-ups. As a consequence, this will negatively affect poor households who have limited capacity of obtaining modern building materials.

5.5. Sustainable Forest Management

In an effort to address environmental and forest degradation, Namibia is a signatory to the Agenda 2030 of the United Nations, which comprises of the 17 Sustainable Development Goals (SDGs). Among the SDGs, SDG 15 targets to promote the implementation of sustainable management of all forest types, curb deforestation, restore degraded forests substantially and increase global afforestation and reforestation (Barbier and Burgess, 2017). There are various strategies that guarantee the involvement of communities in Sustainable Forest Management. Namibia devolved the control and management of forests to local communities, especially those forests with highly-valued timber species (Barrow *et al.*, 2016). This was basically done by adopting and developing community forestry mechanism in strategic areas across the country. This study examined the opinions and perceptions from the sampled target population with regards to the importance of conserving forests and their resources. An analysis was also made to determine the effectiveness of the CFP for Sustainable Forest Management.

5.5.1. The importance of conserving forests

Forests provide valuable goods and services such as food, building materials, shelter and temperature regulation services, among others.

When asked of their opinion on the importance of conserving forests, sixty seven percent (67%) of respondents strongly agreed that it is important to conserve forest and their resources, while thirty two percent (32%) of respondents were just in agreement. The community members are willing to conserve forests because of the goods and services they obtain from the forest, as illustrated in preceding sections. Ninety-one percent (91%) of the respondents value the forest while 51% of respondents indicated that they do not have alternative livelihood sources apart from forest resources. In addition, 90% of respondents indicated that they are affected by deforestation socio-economically and culturally.

Therefore, it is only reasonable that communities consider the forest of utmost importance and worth conserving for people to continue reaping benefits.

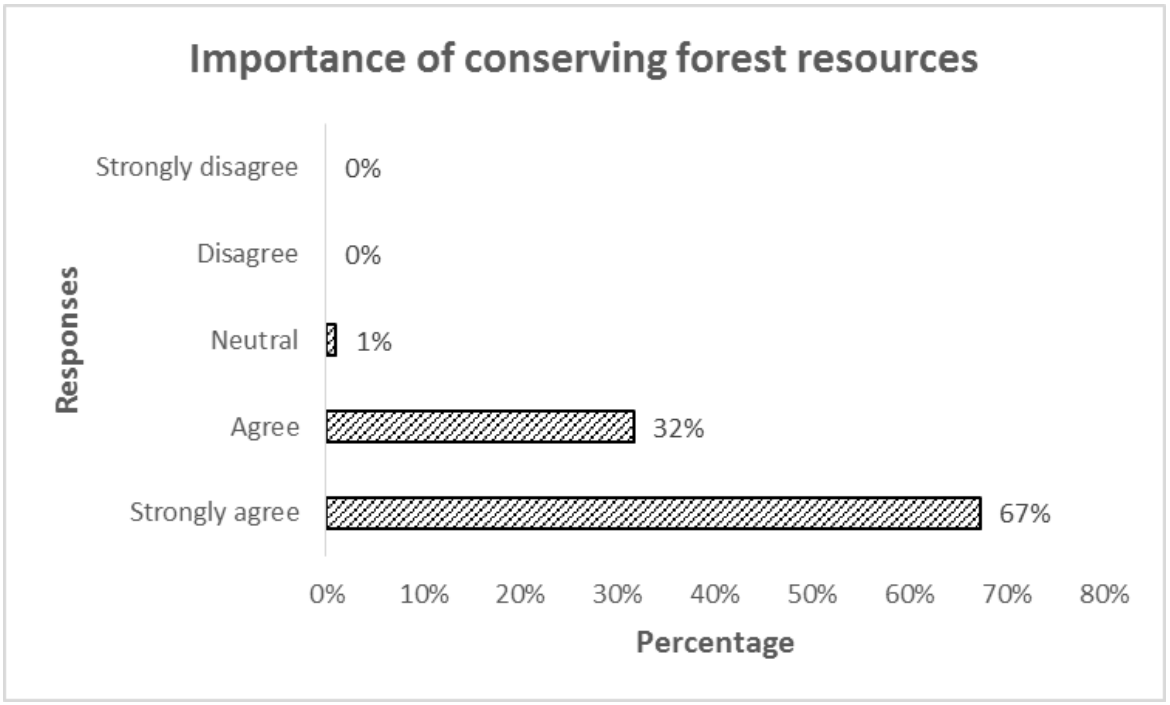

Figure 5.6: *Importance of conserving forest resources. (Author, 2019).*

The survey revealed that no respondent disagreed or strongly disagreed that it was important to conserve the community forest. This shows that the communities of Otshiku-shiIthilonde forest highly see the need of protecting the environment for the benefit of current and future generations.

5.5.2. Participation of local communities in Sustainable Forest Management

Local people play an important role in the sustainable management of forests. Jallah *et al.*, (2017) report that community participation is increasingly becoming a popular way of ensuring Sustainable Forest Management.

Upon inquiry on whether the local people participated in managing the forest, 83% of the respondents confidently affirmed that local community members were actively involved in the management of the forest. This resonates well with the findings of Wekesa (2017) who reports that involving local communities in forest management is important in overcoming ecological shortcomings, improving forest cover and enhancing reformed ecosystems. Wekesa (2017) further points out that there are several factors that help to determine and influence local participation in managing forests such as community awareness level,

individual understanding of the importance of forests, benefits derived from forests and economic impacts of forest resources to rural livelihoods.

Based on the survey responses, the respondents indicated that they were involved in managing the forest in various ways like raising awareness among themselves, selective forest harvesting and encouraging fellow villagers to seek permission from the local traditional authority village headmen/women and the Directorate of Forestry before accessing the forest.

The respondents also declared that they regularly reported illegal forest harvesters to village headmen or women, members of the FMB of Otshiku-shiIthilonde Community Forest or officials of the Ministry of Agriculture, Water and Forestry (Directorate of Forestry) who have the mandate of enforcing law on forest utilisation in the area. The survey respondents also noted that they avoided approaching illegal harvesters and those who did not obey rules due to limited or no law enforcement training.

In the focus group discussion, participants stated that additional efforts were made to educate and engage local people during community gatherings or meetings, especially about the issue of deforestation and its consequences. In the survey, the respondents further indicated that most of the community members practice selective forest harvesting. This is a practice of cutting down certain selected trees in the forest. They further narrated that these people target big trees by only harvesting/cutting off usable mature branches, or harvesting with high consideration of the tree sizes and the spacing between the trees in order to maintain forest cover. The researcher observed that some households have forest reserves in their crop camps. On this basis, the respondents indicated that there is often minimum cutting down of trees, and household members only access the forest when a need arises.

Complementary to existing practices, the respondents concurred that they participated in tree planting initiatives at household and community level as a measure of re-introducing and increasing tree cover. Doswald *et al.*, (2014) attest that an appropriately managed reforestation can play an important role in helping communities to adapt to climate change by reducing the vulnerability of people and the environment to climate risks. Furthermore, it was reflected that reforestation can improve diversification of livelihoods and can be an important practice of enhancing the resilience of rural households (Locatelli *et al.*, 2015). Reforested areas can be an alternative source of resources such as food, animal fodder,

fruits and firewood, especially in times when agricultural fields and natural forests get negatively affected by natural calamities like droughts or floods.

Table 5.8: *Participation of local people in SFM. (Author, 2019).*

Responses	**Count (%)**
Yes	83%
No	17%

The Forest Management Body (FMB) of OCF are mandated by the ordinary members of the community forest to manage the natural resources within the defined boundaries on behalf of all the community members. The regional and local offices of the Ministry of Agriculture, Water and Forestry are mostly responsible to oversee the implementation of the community forest activities and assist with the training of both the FMB and community members on various activities. They are also obliged to guide the community FMB in implementing the forest management plan. However, the survey reveals that 17% of the respondents perceive that local people are not involved in managing the forest. The members of the OCF are vested with powers and responsibilities through the community forest constitution to, among others:

- Express their opinions and to revise the Otshiku-shiIthilonde Community Forest constitution whenever a need arises;
- Monitor and supervise the Forest Management Body activities like reviewing financial reports and minutes of general meetings;
- Protect and conserve all natural resources, both flora and fauna found in the Otshiku-shiIthilonde Community Forest; and
- Monitor and report any illegal activity happening in the Community Forest (MAWF, 2009).

However, some respondents believe that managing and conserving the forest resources is entirely the responsibility of the headsmen/women. With such a perception among some of the community members, this could become a prolonged challenge that may further limit the participation of local communities in managing the forest.

In addition, the respondents noted that the people who show an interest to manage the forest are neither adequately capacitated nor well-trained to ensure the constant flow of information among the communities on the benefits of forests and the consequences of unsustainable utilisation of natural resources.

5.5.3. Effectiveness of Community Forestry Programme for Sustainable Forest Management

Various countries around the world are at different stages of decentralising forest management (Barrow *et al.*, 2016). The strength and authenticity of local-based institutions and programmes that advocate for the sustainable management of forests are important for decentralisation efforts. This is complemented by the willingness of the local people in practicing their rights over natural systems like forests (Barrow *et al.*, 2016). The Community Forestry Programme (CFP) was adopted by the government of the Republic of Namibia in the late 1990s as a strategy of ensuring that local community members sustainably manage and benefit from natural resources. The constitution of Otshiku-shiIthilonde Community Forest indicates that the FMB has, among others, the following responsibilities:

a) To create awareness and mobilise the community to become involved in the management of the forest resources;

b) To determine conditions of use and to agree on these rules (by-laws) within the community which is further subject to the approval of the Traditional Authority and the Regional Councils;

c) To advise the local people and the visitors to handle fire with care to minimise destruction of the forest resources by fire;

d) To direct those seeking wood and other forest products where they can obtain the necessary permits. To this effect, the general population of forest users are expected to guide the CF management on tree harvesting because they are considered as the 'eyes' of the committee members;

e) To ensure that there is good relationship between the committee members and headmen;

f) To educate the community on the importance of sustainable management of forest resources, grazing areas, wild life and other natural resources;

g) To disseminate information to and from the community on issues concerning the development of the community forest and any matters of social economic concern;

h) To facilitate and supervise different community projects such as firewood project, crop projects, and community tree nursery and others; and

i) To improve and maintain good working relationship between the community and institutions working in the areas such as Non-Governmental Organisations and relevant Government institutions; which include the Directorate of Forestry, Directorate of Extension and Engineering Services (DEES) and to solicit funding for capacity building. The committee acts as the point of entry for any future development in the area for multi-sectorial support to the community (MAWF, 2009).

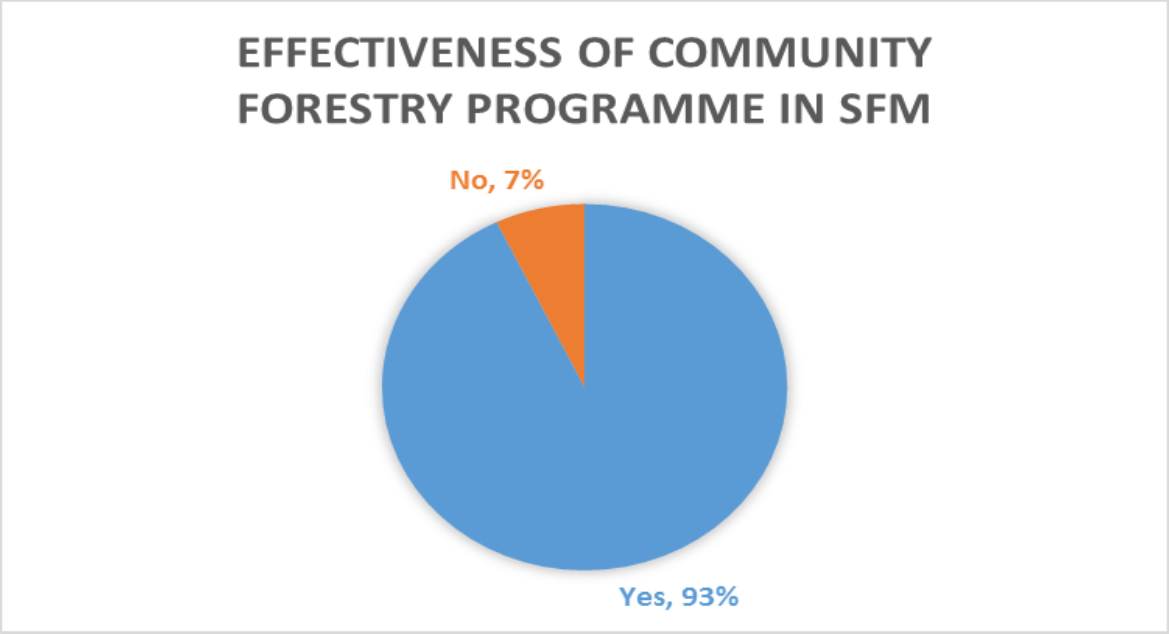

Figure 5.7: *Effectiveness of community forestry programme in curbing deforestation and ensuring SFM. (Author, 2019).*

For the purpose of this study, the respondents were asked whether they perceive the general Community Forestry Programme (Otshiku-shiIthilonde Community Forest) as effective in contributing towards sustainable forest management. From the survey, ninety three (93%) were of the view that the CFP is effective for Sustainable Forest Management (SFM). The respondents further reported that the community forestry programme makes the local people aware of the significance of forest resources, often urging communities to adhere to set laws and operational procedures of both the community forest and customary laws. The respondents further commended the programme, stating that the FMB members in most instances act as forest guards and key educators who are implored to guard the sustainable utilisation of natural resources. Since several of the respondents had indicated

earlier that they believe it is the responsibility of the traditional authority village headmen/women who are responsible for conserving the forest, the headmen issue permits to local people who want to harvest trees and other forest resources. However, the respondents also commended the CFP in providing access to funding and capacity-building opportunities from external government institutions, non-government and civil society organisations to the benefit of local people.

From the survey findings, only 7% of the respondents indicated that the CFP was not effective. As much as the government of the Republic of Namibia tries to promote local conservation efforts through the CFP, the rural communities still lack the general understanding of the importance of natural forest resources. However, the respondents condemned the practice of FMB members who have the tendency of allowing people to cut down trees without any action taken against them. Several of the respondents had no clue or any knowledge upon enquiry on how the CFP is managing the forest.

5.5.4. Local and indigenous knowledge applied in forest management

The previous sub-section presented the perceptions of the respondents on how they regarded the effectiveness of Community Forestry Programme in Sustainable Forest Management. The International Convention on Biological Diversity (CBD) highly recognises the importance of traditional knowledge, innovations and practices of indigenous and local communities for the conservation and sustainable use of biodiversity. Article 8(j) of the CBD requires member states to:

"*Respect, preserve and maintain indigenous knowledge, including innovations and practices of indigenous and local communities embodying lifestyles relevant for the conservation and sustainable use of biological diversity…*" (Gavin *et al.*, 2015: 4).

When asked whether they apply local/indigenous knowledge to conserve the forest resources, 56% of the respondents indicated in the affirmative. From their responses, the respondents explained the principle of "cutting one tree and leaving two or more trees", and also indicated that obeying existing customary rules and procedures of asking permission from village headmen and women as a traditional method of regulating the use and management of forest resource. The respondents further narrated that they provide advice to local traditional leaders to stop allocating large portions of land exceeding the prescribed maximum customarily land of 20 hectares per settler (Malan, 2009). Obeying

customary law of allocating a maximum of 20 hectares per person either for establishing a homestead or crop field may be perceived to be among the traditional ways of managing the forest. Another participant in the FGD argued that the traditional method of creating homestead yards with branches of trees and homesteads' palisades contribute to deforestation in Otshiku-shiIthilonde Community Forest.

The respondents also highlighted the important practice of creating small-scale forest reserves in their homestead yards as a strategy to preserve forest resources. Furthermore, the respondents revealed that they do not harvest rare or endangered species like *Philenoptera nelsii and Philenoptera nelsii* species in the community forest that are of cultural importance, but rather avoid their total disappearance in the area. Similarly, a FGD participant concurred that the concept of cutting down one tree and leaving another to grow is perceived as a traditional method of avoiding total clearance of trees and may therefore be an effective method of reducing deforestation and its impact in the community forest.

Some of the respondents indicated that the community included awareness messages about the importance of forest resources in cultural songs and often make use of opportunities such as community events to raise awareness among the local people. This is done based on local factors of deforestation and the associated consequences thereof. Contrarily, 44% of the respondents indicated that they neither use nor have knowledge of any traditional knowledge applied to conserve forest resources.

5.6. Chapter summary

This chapter presented the data of the study obtained through face-to-face interviews and focus group discussion in evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest. The chapter also presented the socio-demographic and socio-economic characteristics of the respondents, the dynamics of deforestation, the impacts of deforestation on the livelihoods and culture of the communities, as well as the local efforts undertaken to ensure SFM. Some of the key findings from the data collected were presented in the form of charts and tables and were interpreted accordingly to suit the research objectives. The objectives of the study were met and the findings answered the research questions.

CHAPTER 6

Conclusion and Recommendations

6.1. Introduction

The previous chapter presented the results and discussed the findings of the study pertaining to the impacts of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest. This chapter presents the conclusions and recommendations from the study.

The researcher adopted a qualitative approach and two key data collection techniques that comprised of face-to-face interviews and a focus group discussion. This study was guided by four key objectives which included: determining the main livelihoods and their importance to communities in Otshiku-shiIthilonde Community Forest (OCF); evaluating the importance of the forest to the local communities in OCF; identifying indigenous and local activities that have an impact on the forest; and evaluating the impact of deforestation on the livelihoods and culture of communities in OCF.

Primarily, the study targeted the communities in the Otshiku-shiIthilonde Community Forest situated in North-Central Namibia. The data analysis method used involved transcribing information from the data collection tool (semi-structured questionnaire), complemented by data from the focus group discussion held. On that basis, inferences were made from the field data collected.

This chapter also highlights the possible recommendations that may be considered for the wise management and sustainable utilisation of resources in OCF and similar settings elsewhere, as the case may apply. The chapter concludes with suggestions for further research.

6.2. Conclusions

(a) Livelihoods and their importance to communities in Otshiku-shiIthilonde Community Forest (OCF).

The survey revealed that the communities in OCF value both crop and livestock farming practices as important livelihood sources. Also, the study showed that some community members place high value on forest resources, a finding which portrays affirmation that majority of the poor communities in the OCF are supported by forest goods and services. However, the long-term capacity of these livelihood sources to survive internal and

external shocks remain at risk as communities themselves are cognisant that, the potential benefit of future generations and the sustainability of the environment could be compromised if necessary control measures are not undertaken.

(b) The importance of the forest to the communities in OCF.

The survey results reveal that the people in Otshiku-shiIthilonde highly regard the forest as an important natural system that supports them abundantly. This finding is in agreement with that of Nikodemus and Hájek (2015) who report that, Namibia is rich in natural forest resources which are very useful to rural communities. The findings of this study provides affirmation that the communities in Otshiku-shiIthilonde depend on natural resources like firewood from the forest for energy, raw building materials for constructing their traditional homesteads and also value wild forest food products. With reference to the Socio-Ecological System (SES), the findings of this study further support the notion that the interactions between humans and forests are the key determining factors of the integrity of the forest. The system refers to humans as main dependent elements on the system and therefore they are the main contributing factors to the degradation of the forest.

The study distinguished that a margin of the respondents indicated that they do not have alternative livelihoods, apart from being dependent on the forest. These findings resonates with the thoughts of Mogaka, (2001); Nikodemus and Hájek, (2015) who assert that rural households are not much exposed to alternative livelihood sources on which they are able to rely on for extended periods. This effect can be attributed to the low level of local skills' capacities and the limited availability of work opportunities (Ashley and LaFranchi, 1997; Kamwi *et al.*, 2018). In recent years, most of the available livelihood opportunities require qualified people with reliable skills, while such opportunities remain scarce in rural areas. This is the case because the young people who migrate to urban areas for better education and subsequent work opportunities rarely return back to the rural areas to invest their acquired skills. Hence, they deprive the uneducated local people the opportunity to acquire skills which they can use to make a living and as an alternative livelihood.

(c) The impact of local/indigenous activities on the forest.

The evaluation of the effect of local activities on the forest showed that local communities have the ability to cause positive or negative influence on the local forest. As outlined in the SES, humans are the main dependent elements in the system. The study revealed that

poverty, the high demand for natural resources and natural factors are perceived as common factors of deforestation in the Otshiku-shiIthilonde Community Forest. Furthermore, the study survey also affirmed that local practices (crop and livestock farming) have an influence on the forest. However, there are other non-human factors and interactions that contribute to forest degradation, such as forest fires. These cause-effects contribute and increase the impacts of climate change. Clark (2012) asserts that some of the consequences of deforestation include, among others, the temporary increase in agricultural production and possible extinction of endangered species. Despite the fact that livestock farming and crop production have a negative impact on the forest, the survey, however, reveals that indigenous knowledge and community-based programmes may be suitable interventions that. If promoted within the community, these programmes can enhance forest conservation, and reduce environmental and social vulnerabilities. This resonates with the certainty of Shilabukha (2015) who notes that there is little extra that can be learned from how communities make use of traditional measures to protect natural resources by applying indigenous knowledge.

(d) The impact of deforestation on livelihood and culture of communities in OCF

This study shows that the majority of the respondents noted that deforestation has a negative impact on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest. The respondents attributed the recurrent droughts as immediate consequences of deforestation. The respondents highlighted drought as one of the consequences of deforestation that has a negative impact on crop and livestock productions on which the communities in OCF mostly rely on for their livelihood. The respondents further reasoned that the availability of forest goods (food products) has reduced because of unsustainable harvesting and over-utilisation of the forest. Among the examples that were highlighted were the wild animals that are treasured for their skins being used for cultural attires and medicinal plants. The respondents asserted that their numbers have significantly reduced in the surrounding areas due to deforestation and continued human disturbances on the environment.

The respondents also affirmed the negative impact on the culture of communities in Otshiku-shiIthilonde Community Forest, particularly on their common practice of constructing traditional houses which is negatively influenced. The unsustainable utilisation of woody forest resources compels the local people to increasingly use modernised resources, such as corrugated iron sheets and cement bricks, other than natural

resources to construct their houses. Although these modern sources may be good for development, their increased usage could result in increased vulnerabilities such as the loss of traditional coping capacities, reduced access to livelihoods, increased urbanisation and a negative impact on the environment. The modernisation of houses using cement bricks instead of the usually preferred tree logs for construction could result in a gradual cultural downgrade in the long-run. This lifestyle change may also result in increased financial burdens that will have a relatively negative impact on poor households.

6.3. Recommendations

The study highlighted that poverty and the high demand for natural resources are the highest perceived factors of deforestation in Otshiku-shiIthilonde Community Forest. This is the case that subsistence agricultural practices are the important livelihood sources for the majority of communities in OCF, while natural resources (poles, firewood, etc.) are commonly used on a daily basis for household chores. However, the importance of conserving the forest and its resources in the OCF cannot be over-emphasised. This environmental challenge can be addressed through effective and efficient human interventions or addressing the interactions with the environment through programmes such as community forestry. The community forestry programme and the indigenous/local knowledge applied can be effective measures of ensuring Sustainable Forest Management (SFM). Plugge *et al.*, (2014) also suggest that it is important to consider the dynamics of populations by attending to social issues and recommending alternatives in order to promote SFM.

In this context, alternative measures may include promoting improved agricultural production practices and the implementation of alternative building materials and sources of energy to substitute firewood usage. Traditional practices such as reforestation, selective harvesting (cut one, leave two or three trees), prescribing maximum hectares of land allocation (20 hectares) and preserving camps of trees in crop fields are in line with the good scientific practices to curb deforestation. This study further recommends the integration and application of scientific and indigenous systems; and also encouraging the adoption of alternatives to further empower and advance local communities for improved safeguarding of the forest and environment. Implementing SFM should considerably focus on the direct factors of deforestation, in this case, poverty and the high demand for natural

resources (firewood, poles, etc.) for sustained rural livelihoods and reduced cultural impact of deforestation.

The existence of local traditional authorities, laws on forestry, and the forest management committee of the Otshiku-shiIthilonde Community Forest are some of the functional systems which the study revealed that may play an integral role in controlling forest resource utilisation. Therefore, their efforts toward community education and law implementation should be upheld.

6.4. Suggestions for further research

- It is recommended that future researchers could conduct a thorough analysis on the fundamental role and effectiveness of indigenous knowledge systems used to control deforestation in Otshiku-shiIthilonde Community Forest. Such an enquiry would allow for the obtaining of in-depth understanding on behaviours of humans and the governing reasons thereof towards forest use and management, as inquired by Tanyanyiwa and Chikwanha (2011).

- This study could have been more comprehensive if included communities living on the outskirts of the OCF. Therefore, possible future research studies should have an extended timeframe and adequate resources that would enable the communities outside the OCF to be surveyed.

- Namibia is a vast country and the dynamics of deforestation and impacts on local people and the environment are manifold and different in each areas of the country as the case may be. A similar study, possibly with a different approach/methodology should be undertaken in other community forests for a broader analysis of the impacts of deforestation on other indigenous communities in Namibia.

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Appendices

Appendix I: Statement of Informed Consent

My name is **Shivute Ndeshimona Ngeendina Nangula** (Student Number **2017024213**), a registered final year student pursuing a Masters' in Disaster Management at the University of the Free State, South Africa. I am conducting a research study titled "Evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest, Namibia" in partial fulfilment of the requirements for award of the degree.

I hereby kindly request your consent to participate in this study through a short interview guided by a semi-structured questionnaire.

Before taking part in this study, you are strongly encouraged to read the following statement below explaining the aim, purpose and procedures of the study;

Aim, purpose and procedure of the study

This study aims to evaluate the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest, Namibia.

Currently, there is no research of this nature that has been conducted in the community-based natural resources management settings in Namibia that contextualise the impact deforestation has on rural livelihoods and cultures of indigenous communities in the country.

Your participation in the study includes permitting me to host you for an interview guided with a semi-structured questionnaire. The information obtained from this survey will have a great impact to this study. The interview will only take about 10 to 15 minutes to complete.

Risks and Distresses

There are no risks or discomforts that are anticipated from your participation in this research.

Benefits of the study

There is no individual benefit that could emanate from participating in this study. However, the information provided will be valuable in understanding the dynamic relationship indigenous/local communities in Otshiku-shiIthilonde Community Forest have

with the natural forest, how their livelihoods and culture are impacted by continued deforestation and make an analysis of the remedial measures taken at community level to ensure the sustainable management of forest ecosystems.

Confidentiality

The information gathered during this study will be treated with high confidentiality and your participation will remain unanimous throughout the research. Other identifying details will not be revealed in any publication of this study. Kindly note that only the principal researcher will have access to the data obtained from the study, and the outcomes of the research will be published in the form of a dissertation, and a journal (scientific article).

Withdrawal without prejudice

Participation in this study is voluntary; refusal to take part in the interview will not involve any penalty. You are free to withdraw consent and discontinue participation at any time without prejudice.

Study clarification

Please feel free to ask for clarity on any aspect of this study by directing your questions or issues of concern on, +264 81 498 9735 or email 2017024213@ufs4life.ac.za

Appendix II: Research Questionnaire for the face to face interviews

EVALUATING THE IMPACT OF DEFORESTATION ON THE LIVELIHOODS AND CULTURE OF COMMUNITIES IN OTSHIKU-SHIITHILONDE COMMUNITY FOREST, NAMIBIA.

I'm Shivute Ndeshimona Ngeendina Nangula (***Student number: 2017024213***), a student enrolled at the University of the Free State, South Africa pursuing a Master Degree in Disaster Management. My Mini-Dissertation is titled: *Evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest, Namibia.* To complete this research study, I humbly request your participation in this survey by answering the questions set in this semi-structured Questionnaire. Please note that by completing this questionnaire, you have voluntarily agreed to participate in this research study; you will remain anonymous and; your information will be treated confidentially. You may withdraw from participating in this study at any given moment during the completion of the questionnaire. The information obtained in this study will be used for academic purpose only and the findings of this study may be published.

I highly appreciate your participation in making this study a success.

General instructions:

- Please indicate with a cross (***X***) your applicable answer.
- Feel free to elaborate or give more details where it's applicable.

SECTION 1: SOCIO-DEMOGRAPHIC INFORMATION

1. Age group:

16 to less than 25	26 to less than 35	36 to less than 45	46 and above

2. Gender:

Male	
Female	

3. Highest education level completed?

Never attended school	Primary Education	Junior education	Secondary Education	Tertiary Education

4. Marital Status:

[ ] Single [ ] Married [ ] Widowed [ ] Divorced [ ] Separated

5. How long have you lived in Otshiku-shiIthilonde Community Forest?

Years	<1 year	2 to 5 years	6 to 10 years	11 to 20 years	More than 20 years

SECTION 2: SOCIO-ECONOMIC

6. Which of the following do you own?

Assets owned	**Yes**	**No**
Radio		
TV		
Bicycle		
Motor		
Bike		
Car/truck		
Cell phone		
Axe		
Large knife/machete		
Plough		
Beds/bed mats		
Goats		
Sheep		
Pigs		
Chickens		
Cattle		
Other (*specify*): ……..**.....**		

7. Which of the following farming activities do you regard the most important?

Crop farming	
Livestock farming	
Both practices	
Others (*please specify):* …….	

8. Does the household belong to any associations or groups? (i.e. farmers' association, women cooperative, etc.)

YES	
NO	

9. Does your household members have alternative livelihood source, apart from the forest?

YES	
NO	

10. If ***YES*** to question 9, please select the source of income:

1	off-farm employment	
2	work-at-home opportunities	
3	occasional or seasonal work for hire	
4	your own small or large business that provides you with income	
5	freelancing or contracting in a field of expertise	
Other (*specify*): ……..		

11. Forest resources are very valuable.

Strongly agree	Agree	Partially agree	Disagree	Strongly disagree

12. Rank the following forest products according to their importance. (*1 = Most Important, 2 = Important, 3 = Neutral, 4 = Least important, 5 = Not important***)**

Firewood	
Medicines	
Food e.g. berries, mopane worms	
Raw building materials	
Economic benefit	
Others: (*please specify*) ……	

SECTION 3: CAUSES OF DEFORESTATION

13. Have you ever heard of deforestation?

YES	
NO	

14. If ***YES*** to question 13, briefly explain what deforestation means

……

……

……

……

15. In your opinion, what are the main causes of deforestation in Otshiku-shiIthilonde Community Forest? *(Please select the top five main causes and rank them from 1 to 5, with 1 being the highest and 5 the lowest causes)*

Causes	**Select**	**Rank**
Lack of capacity		
Poverty		
Ignorance		
Clearing land for crop fields and rangelands		
High demand for natural resources (*firewood, poles, etc.*)		
Natural factors (*e.g. forest fires, frost*)		
Other causes: (Specify) ……..		

16. Agricultural activities have a negative impact on the forest.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

17. The Otshiku-shiIthilonde Community Forest was more widespread 5 years ago than now?

Strongly agree	Agree	Partially agree	Strongly disagree

SECTION 4: IMPACTS OF DEFORESTATION

18. Does deforestation affect your livelihood?

YES	
NO	

19. Briefly explain your answer to question **18** above:

……

……

……

……

……

20. Does deforestation affect your culture?

YES	
NO	

21. If ***YES*** to question 20, briefly explain how:

……

……

……

……

……

SECTION 5: FOREST MANAGEMENT

22. It is important to conserve the forest resources. (*Cross (**x**) the answer of your choice*)

Strongly agree	Agree	Neutral	Disagree	Strongly disagree

23. Are the local people involved in the management of the forest?

YES	
NO	

If ***YES***, please explain how:

……

……

……

If ***NO***, what could be the challenge?

……

……

……

24. Do you think the forest will be better conserved if management is based on your local practices of forest management?

YES	
NO	

25. Is the community forestry programme effective in managing forests sustainably?

YES	
NO	

26. Explain your answer to question **25** above:

……

……

……

27. What other ways can you suggest for the sustainable management of forests?

……

……

SECTION 6: CULTURE AND INDIGENOUS KNOWLEDGE ON FOREST

28. Do you apply any indigenous/cultural knowledge to conserve the forest resources?

YES	
NO	

29. If ***YES*** to question 28, state how indigenous knowledge is applied to manage forest resources?

……

……

……

……

……

THANK YOU FOR YOUR TIME AND PARTICIPATION!!

Appendix III: Focus-group-discussion Questions

1. How does deforestation impact communities' livelihoods and culture?

2. What cultural/indigenous knowledge or practices are done to mitigate deforestation, apart from community forestry?

3. What are the main challenges to SFM?

Appendix IV: Consent letter from the Ministry of Agriculture, Water and Forestry

REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND FORESTRY

Tel: (061) 2087663
Fax: (061) 2087665

Office of the Director
Directorate of Forestry
Government Office Park
Private Bag 13184
WINDHOEK

01 July 2019

Mr. Shivute N.N. Nangula
Student: Master in Disaster Management
University of the Free State (UFS)
Bloemfontein, South Africa

Dear Mr. Nangula,

CONSENT TO CONDUCT RESEARCH IN OTSHIKU-SHIITHILONDE COMMUNITY FOREST FOR MASTER IN DISASTER MANAGEMENT

On behalf of the Directorate of Forestry in the Ministry of Agriculture, Water and Forestry, we appreciate you for choosing to conduct your academic research in the newly gazetted Otshiku-shiIthilonde Community Forest, with your research topic: Evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest, Namibia.

Your study looks to explore and understand the impacts of the environmental hazard (Deforestation) on rural communities, a challenge that could impede sustainable natural resources management and development as advocated for through Community-based Natural Resources Management (CBNRM) programme adopted by the government of the Republic of Namibia.

Consent is hereby granted for you to conduct your study in Otshiku-shiIthilonde Community Forest, and look forward to sharing your findings with the Directorate of Forestry. All the best!

Yours Sincerely,

……

Joseph Hailwa

Director of Forestry

Appendix V: Language Editor Certificate

ANIEBO BENITA HAGAN
Unit 104 Main Hill
137 Main Road, Green point
Cape Town 8051.
Tel: +27 (0)81 303 7784
Email: aniebosa@gmail.com

30 – 01 – 2020

TO WHOM IT MAY CONCERN

LANGUAGE EDITING OF SHIVUTE NDESHIMONA NGEENDINA NANGULA'S MASTERS THESIS

I, the undersigned, **Aniebo Benita HAGAN**, write to acknowledge that I have language edited a completed Masters' thesis entitled: ***Evaluating the Impact of Deforestation on the Livelihoods and Culture of Communities in Otshiku-Shiithilonde Community Forest, Namibia*** authored by **SHIVUTE NDESHIMONA NGEENDINA NANGULA**, in partial fulfillment of the requirement for the award of a Masters Degree in Disaster Management, Faculty of Natural and Agricultural Sciences at the University of the Free State, Bloemfontein, South Africa.

The responsibility of implementing the proposed language changes rests with the author of the thesis.

Yours Sincerely,

Aniebo Benita HAGAN

Appendix VI: Ethical clearance Certificate

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

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

14-Sep-2019

Dear Mr Nangula, Shivute SNN

Application Approved

Research Project Title:
Evaluating the impact of deforestation on the livelihoods and culture of communities in Otshiku-shiIthilonde Community Forest, Namibia.

Ethical Clearance number:
UFS-HSD2019/1282

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. Furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Digitally signed by Derek Litthauer
Date: 2019.09.14 19:50:44 +02'00'

Prof Derek Litthauer
Chairperson: General/Human Research Ethics Committee

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