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Floods And Sustainable Development: The Case of Nsanje District

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Abstract

A section of Nsanje District has been experiencing floods for over a decade and was declared a flood prone area the same time (GoM, 2006). Therefore, firstly, this research seeks to understand how the communities that live in the flood prone areas perceive their vulnerability to floods and how some of them have been coping with the floods since 1952, just over 6 decades.

The overall aim of the research was to understand the impact of floods on sustainable development and how communities living in flood prone areas perceive their vulnerability to floods and climate variability, to investigate the power dynamics at household and community level and to explore the complexities associated with local adaptation programs in the flood prone areas.

This research contributes towards framing vulnerability based on the perception of the different groups of people that are vulnerable to climate variability and have experienced environmental changes throughout their everyday lives. The communities living in the flood prone areas perceive floods as part of their livelihood. The communities have experienced floods for over 5 decades and have been implementing adaptive strategies to help them cope with the floods during this time. Temporary migration is one of the effective adaptive strategies that the communities living in the flood prone areas implement during floods.

This research also presents evidence that the complexity of local adaptation arises from the political, economic, social, cultural and institutional factors and processes that interplay within the households and communities. Sometimes, these same factors and processes work against effective local adaptation at both household and community level. However, Engle (2011) claims that adaptive capacity of a nation or community that is affected by climate variability is influenced by the institutions, management and governance. The findings presented in this thesis illustrate that at household level, women are not given a chance to contribute to household resilience to climate variability because of cultural values that suggest that women are subordinates and that therefore only men have the authority to actively participate in such developmental activities.

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LIST OF ABBREVIATIONS

ACPC	**Area Civil Protection Committee**
AIDS	**Acquired Immune Deficiency Syndrome**
AFDB	**African Development Bank**
DCPC	**District Civil Protection Committee**
DDP	**District Development Plan**
DoDMA	**Department of Disaster Management Affairs**
DFID	**Department for International Development**
FGDs	**Focus Group Discussions**
GoM	**Government of Malawi**
HFA	**Hyogo Framework for Action**
HHs	**Households**
HIV	**Human Immunodeficiency Virus**
IHDP	**International Humanitarian Dimensions Program on Global Environment**
IMF	**International Monetary Fund**
IPCC	**Intergovernmental Panel on Climate Change**
KLL	**Key Informant Interviews**

NAPA **National Adaptation Programme for Action**

NGO **Nongovernmental Organisation**

OCHA **United Nations Office for the Coordination of Humanitarian Affairs**

SPSS **Statistical Package for Social Science**

T/A **Traditional Authority**

UNFCCC **United Nations Framework Convention on Climate Change**

UNDP **United Nations Development Project**

UNISDR **United Nations International Strategy for Disaster Reduction**

UNDAC **United Nations Disaster Assessment Coordination**

CHAPTER ONE:

INTRODUCTION

1.0 Introduction

The motivation of this research is based on the extent and intensity of floods in flood prone areas, and the growing scholarly and personal interest to understand the context and dynamics of vulnerability to floods and local adaptation. The main objective was to understand the impact of floods on sustainable development specifically how communities living in flood prone areas perceive their vulnerability to floods and how they are coping with the floods in situ. This chapter presents the research questions that this thesis sought to answer. It also presents the methodology that was used to collect data and finally, the thesis layout with brief description of what is presented in the different chapters.

1.1 Background of the study

In January, 2015, Malawi experienced fatal floods which affected 15 Districts out of the 28 Districts and a state of emergency was declared by the President of the Republic of Malawi on January, 13th, 2015 (DoDMA, 2015). During that time, 1,102,364 people were affected by the floods, 104 people were reported dead, 645 people injured, 172 people were reported missing and 336,053 people were displaced with 225 displacement sites (Ibid). In Nsanje, where the research was conducted, out of a population of 238,103, 74,250 people were displaced in 22 displacement sites, representing 28% of the total population in the district, of which 31 people died, and 153 people were reported missing (DoDMA, 2015a). A section of Nsanje District has been experiencing floods for over a decade and was declared a flood prone area the same time (GoM, 2006). Therefore, firstly, this research seeks to understand how the communities that live in the flood prone areas perceive their vulnerability to floods and how some of them have been coping with the floods since 1952, just over 6 decades. This study is important because it

contributes to knowledge on understanding the changes in the extent and intensity of the floods in flood prone areas and the corresponding adaptive measures that have been implemented over the years.

In 2012, communities living in flood prone areas of Nsanje District experienced devastating floods that resulted in loss of property and damage to infrastructure (DoDMA, 2012). Furthermore, following a flood in 2009, a declaration was made that TA Nyachikadza, one of my research sites, was no longer habitable because it is surrounded by a marsh and due to the geographical position of the area it was prone to extreme flooding (DoDMA, 2010). In the same year, some villages in Traditional Authority Mlolo, under Group Village Kadyamba were also declared uninhabitable due to the severe flash floods that were experienced in the areas. The Government of Malawi through officials from the Department of Disaster Management Affairs (DoDMA) advised the communities living in these areas who are mainly communities to move to upland areas, which are not prone to flooding. The first meeting was held in 2010, then in 2012 and the last one in 2015 where DoDMA officials strongly advised communities living in flood prone areas to relocate upland so that they should reduce the impact of floods on their lives. However, the communities have refused to relocate and have insisted on living in the flood prone areas. Even after the 2015 floods, the majority of the communities moved back to the flood prone areas (Nsanje District Council, 2015b). Currently, there is no data that explicitly explains the factors that motivate communities to live in flood prone areas. However, there have been claims from various individuals through the media, that suggest that the communities continue living in flood prone areas because they are used to receiving handouts and humanitarian relief support and services during floods (Nyasatimes, 2012). This research therefore secondly seeks to understand the factors that motivate communities to continue living in the flood prone areas despite the previous experience and exposure to devastating floods.

For over a decade, there have been climate change adaptation programs in Nsanje District according to Nsanje District Development Plan targeting communities that live in flood prone areas to help them minimise the risk and vulnerability to floods (Nsanje District Council, 2010b). Over the years as evident by the 2009, 2012 and

2015 floods, there has been a noteworthy increase in the number of households that cannot cope with the floods. Recently, there has been an increase in the number of communities that have become more vulnerable to floods over years and struggling to cope with the floods without external support (DoDMA, 2015b). However, there has been no research that sought to understand and explain why these communities are failing to be resilient to the floods despite all the investments made through climate change adaptation programs. This research furthermore explores some of the challenges that these people face which have exacerbated their vulnerability to floods.

1.1.1 Vulnerability and Adaptation to Climate Change Variability

Until 2006, only 6 districts were affected by climate variability, including floods in Malawi, with no reported deaths (GoM, 2006). After close to a decade, Malawi had become more vulnerable and exposed to floods that affected a larger population (DoDMA, 2015a). According to McSweeney et al. (2008) Malawi experienced a 0.9 degrees Celsius increase in the mean annual temperature between 1960 and 2006, which reflects an average rate of 0.21 Degrees Celsius increase per decade. Furthermore, McSweeney et al. (2008) predict an increase of rainfall up to 19% by 2090 using their rainfall model.

However, the authors did not explicitly predict the extent of the impact on communities living in flood prone areas, the extent of their vulnerability and how complicated local adaptation would become. It is clear that some groups of people and some regions would be more vulnerable than others although there have been various uncertainties in climate variation, there is need to come up with adaptation strategies that go beyond the activities that these people are currently implementing to cope with climate variation (Adger et al., 2004). Scholars reveal the need to prepare and plan for the unknown extent of risks to reduce vulnerability and be able to cope with the extreme weather events.

However, with the recent global disasters as a result of extreme weather events, it is clear that there is need to understand the realities within the vulnerable communities in terms of their perceptions, power dynamics and local adaptation to be able to have adequate data to facilitate informed debates in climate variability, vulnerability and adaptation discourses.

The Intergovernmental Panel on Climate Change, IPCC (2013) has stressed that global temperatures are increasing hence very likely that there would be huge negative impacts on the climate, environment and the various ecosystems. In addition, the United Nations Framework Convention on Climate Change UNFCCC (2013) indicate that developing countries will suffer more because they are more vulnerable to climate variability due to inadequate capacity in terms of finances and expertise to deal with the negative impacts of climate variability. Within the affected communities, people are affected differently depending on various factors including social class, gender, age, geographical position, culture and group (Paavola, 2008, Kakota et at., 2011). The studies furthermore emphasise that even though an area would be affected by the same effects of climate variability, the poorest of the poor would be affected more because of lack of alternative sources of livelihood and cash; orphans, women, people living with disability and people living with Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) would be heavily affected (ibid).

Due to various differences in factors contributing to vulnerability, adaptation measures are also different and they depend partly on culture, geographical positions, local and institutional changes, and power (Bougsty-Marshall, 2016). Goldman and Riosmena, 2013; O'Brien and Wolf, 2010). The differences in various factors that contribute to vulnerability and hence influence local adaptive capacity have demanded more research in various parts of the world to better understand the context of vulnerability and the dynamics of local adaptation to climate variability (Wisner et al., 2004). Trawöger (2014) emphasises that there is a need to deeply understand the local perspectives of climate variability in order to deliver climate change adaptation projects and programs that would enhance community resilience effectively and efficiently (Trawöger, 2014).

The global perspective of climate change and the associated risk should not be generalised but rather should be case specific in order to design appropriate approaches to adaptation to climate variability (Ibid). There are gaps in the vulnerability literature in terms of understanding climate change impacts on natural systems and social economic trajectories, including adaptation, which necessitates the need for more case studies to understand these relationships and interactions (Tucker et al., 2015). In addition, Harrison and Chiroro (2016) stress the need to understand the contexts that shape vulnerability and how communities differ within themselves to better develop adaptation and resilience projects that foster sustainable development. This thesis therefore seeks to fill the identified gaps and contribute to literature

on framing environmental migrants based on differentiated self-perceived vulnerability to floods. The thesis furthermore examines differences in local adaptation strategies based on differences in spatial locations and exposure to floods using Nsanje District in Malawi as case study. Both quantitative data through household survey and qualitative data through key informant interviews, focus group discussions and participant observations was collected and utilised for this thesis.

1.2 Research Context

In Malawi, regardless of the efforts to make households and communities resilient to climate variability through climate adaptation related projects as stipulated in the National Adaptation Plans of Actions, evidence from post disaster assessments in 2012 and 2015 (GoM, 2012, 2015) indicate that the communities are becoming more vulnerable with little resilience and capacity to recover after the climate shocks. In 2006, only 6 Districts were prone to disasters including floods (Government of Malawi, 2006) whilst in 2015, 15 districts were affected by the floods, with many people being displaced.

United Nations Office for the Coordination of Humanitarian Affairs (OCHA) During the January 2015 floods, the damage caused by floods was estimated at US$335 Million, with a need of US$494 Million for recovery and reconstruction. The most heavily affected sector was housing, seconded by agriculture, and thirdly transport. (Table 1)

Table 1 Post Disaster Needs Assessment Findings in Malawi

Sector	Subsector	Total Disaster Effects (Damage and Losses)		Recovery and Reconstruction Needs	
		MWK million	US$ Million	MWK million	US$ Million
Productive	Agriculture	29,563	68	33,965	78
	Industry & Trade	4,690	11	1,400	3
Social	Education	5,390	12	9,946	23
	Health	5,334	12	4,384	10
	Housing	60,414	139	76,230	175
Infrastructure	Energy	457	1	1,120	3
	Transportation	21,941	50	46,210	106
	Water and Sanitation	11,148	26	25,815	59
Cross cutting	DRM	750	2	1,554	4
	Environment	1,565	4	6,250	14
	Social Protection	1,706	4	3,196	7
	Nutrition	2,605	6	4,973	11
	Total[1]	**145,563**	**335**	**215,043**	**494**

Source: Department of Disaster Management Affairs, 2015

In Sub Saharan Africa, ODI and CDKN (2015) reveal that many countries in the region, including Malawi do not invest in long term climate change adaptation strategies hence exacerbating the vulnerability to floods in the long term. In addition, lack of appropriate climate information in most developing countries to enable the flood victims to plan accordingly has been argued to be one of the factors that has exacerbated vulnerability to floods. Investing in long term climate change adaptation plans requires more financial and technical resources which currently most developing countries do not have. The UNFCCC strongly recommends that developed countries should commit themselves to helping developing countries to cope with the extreme weather events even though the reality suggests that little is done towards implementing that (UNFCCC, 2013).

In other contexts, Stasavage and Moyo (2000) cite an example of how the International Monetary Fund (IMF) imposed a cash budget system in Uganda and Zambia as a means to decrease the deficit on the budgets of the countries. These two countries were directed to spend only on what they have as cash to reduce overspending by the government which results in recurring government deficit. Contrary to the direction, there was evidence that the politicians and national employees managing the funds did not agree with the system since they had their own way of implementing the national activities. These examples of how donors impose how governments in the global south should manage the donor funds intrinsically reveal power dynamics in bilateral aid and donor conditions where the developing countries receive aid but have to implement the programs the way the donors want.

Bryan et al. (2009) stress that climate variability will mainly affect communities living in Africa because agriculture is their main source of income. A better understanding of community's perception of climate change, adaptation strategies and decision-making processes are critical to inform policies that focus on promoting successful adaptation strategies (ibid). This thesis emphasises that missing the underlying causes and differences in the extent of vulnerability has led to the generalisation of adaptation strategies that are not applicable in some areas. For example, adaptation projects in Malawi focus on sustainable and climate smart agriculture (DoDMA, 2013) even in flood prone areas which is purely a short-term strategy and not effective to prevent damage and harm from floods. Hunger, famine and permanent migration are factors that usually threaten poor households whilst economic losses affect mainly those who have valuable assets (Ribot, 1995). At local level, it is argued that different people are affected differently by climate variability, even though adaptation strategies are designed to address vulnerability equally amongst the affected communities. Ribot (2014) stresses that there is a need hence to study different cases separately to deeply understand the underlying causes of vulnerability to floods at local level and how the communities that are affected by the floods cope with the floods in order to inform policies and guide development practitioners on what is feasible and to whom, with evidence. This thesis explores therefore is important because it provides evidence of how vulnerability to floods is created, differentiated and exacerbated in Nsanje Districts and how the affected communities are responding to the floods.

Dilling et al. (2015) reveal that vulnerability is dynamic and complex such that there is no definite long-term strategy to reduce vulnerability due to unstable ecosystems, culture, social interactions and landscape with time. Furthermore, the authors suggest that short term adaptation is possible although they doubt the likelihood of long-term resilience using fixed climate change adaptation policies and strategies (ibid).

Long term resilience can only be determined by the way the people who are affected by climate variability frame their vulnerability to the floods over time and therefore take appropriate actions accordingly to address their vulnerability to floods. This thesis provides evidence that vulnerability to floods is dynamic and differentiated therefore communities respond to the floods based on the way they have been affected by the floods. In other words, the extent and intensity of floods determines how the communities respond to floods therefore suggesting that adaptation strategies are also dynamic. Fixed long term strategies that are targeted towards addressing climate variations must therefore be considered with caution because there are cases where they may not be applicable. Fixed climate related decisions that are made at different stages may affect vulnerability either positively or negatively in the long term.

This thesis explores the factors and processes that affect the smallholder farmers that live in flood prone areas as they cope with the floods. These factors and processes include power dynamics within the sociocultural environment and the interaction between political and economic factors within flood prone areas.

1.3 Problem statement

Currently, there is no data that explicitly explains the factors that motivate people to live in flood prone areas. However, there have been claims from various individuals through the media, that suggest that people continue living in flood prone areas because they are used to receiving handouts and humanitarian relief support and services during floods (Nyasatimes, 2012). Floods have negatively affected the sustainability of the overall development of the district. Despite huge investment to deal with effects of floods in Nsanje district, the continued trend of floods continues posing a threat to the overall development of the district

A lot of research has been conducted in the area of Floods, however in Malawi *Floods and sustainable development while* considering Nsanje district has not been studied conclusively. It is against this backdrop that this study would like to establish the impact of floods on sustainable development.

1.4 Objectives of the study

1.4.1 Main Objective

The overall aim of the research was to understand the impact of floods on sustainable development and how communities living in flood prone areas perceive their vulnerability to floods and climate variability, to investigate the power dynamics at household and community level and to explore the complexities associated with local adaptation programs in the flood prone areas.

1.4.2 Specific objectives

- To find out how do communities living in flood prone areas perceive their vulnerability to floods?
- To find out what motivates communities to stay in flood prone areas?
- To investigate factors that have caused the communities living in flood prone areas to continue being vulnerable to floods?

- To find out if flood management strategies mainstream sustainable development approaches in its implementation

1.5 Research Questions

- How do communities living in flood prone areas perceive their vulnerability to floods?
- Why are communities motivated to stay in flood prone areas?
- What are the factors that have caused the communities living in flood prone areas to continue being vulnerable to floods?
- How does flood management strategies mainstream sustainable development approaches in its implementation?

1.6 Significance of the Study

The research findings would give guidelines to the Malawi Government in the formulation of appropriate laws and policies that would seal the loopholes that create hindrances on sustainable development

To the academicians this study may contribute to the literature of floods and sustainable development within the country which already exists. In addition, the study may also stimulate further research on the area of floods and sustainable development in particular in Malawi and other countries

1.7 Structure of the paper

The study has been organized into five chapters.

Chapter 1: Introduction. Chapter one gives a general introduction and background to the topic of study. It also presents the problem of the study, research objectives and research questions. Finally, it presents significance of the study and chapter summary.

Chapter 2: Literature Review. Chapter two deals with the review of literature pertaining to the research study. It presents theories and concepts that are related to the study. It also presents previous work related to the study and conceptual framework of the study. Chapter 3: Research Methodology. Chapter three gives description of the research process and the methods adopted for collecting and analyzing data. Chapter 4: Research Findings and Discussion. This chapter presents results from the research questionnaires which are analyzed using SPSS and presented in tables and figures. Mainly it contains demographic results of the participants and the main results on the effects of employee participation on the organization performance Chapter 5: Conclusions and Recommendations. Chapter five summarizes the findings, conclusions and relevant recommendations are presented.

1.8 Chapter Summary

This chapter has presented the general overview of this study. It has also presented the background of the study, problem statement, research objectives and the significance of the study. In addition, the chapter

has presented the overall and specific questions, the significance of the study and finally, it has presented the structure of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of literature on the impact of floods on sustainable development , particularly paying attention to floods and unpacking the concept of 'vulnerability' (UNFCCC, 1992; Ribot, 1995; Adger, 1996a). Furthermore, literature is reviewed in order to understand the different factors that contribute towards vulnerability to climate variability in general, followed by various case studies that describe vulnerability in context, local adaptation and the barriers and limits to local adaptation. Finally, the main debates in the literature are summarized and ways in which this research fits into the wider academic discourse on impact of floods on sustainable development vulnerability and local adaptation. This thesis recognizes that vulnerability in flood prone areas is created and exacerbated by several factors, including social, environmental, cultural, technological, economic, political and historical factors. In addition, the thesis acknowledges that a transformational change in the way adaptation initiatives are designed is important in order to incorporate all these factors which would help to reduce vulnerability and enhance the local adaptive capacity.

2.1 Theoretical literature

Malawi, like many Southern African countries, is experiencing increasing climate change and variability, which results into poor crop yields and/or even total crop failure due to drought and floods. Being an agro-based economy with more than 85% of the population relying on rain-fed agriculture for their livelihood and survival, the level of vulnerability has increased with the increasing extremes of drought, flooding and erratic rainfall patterns (Government of Malawi, 2006). For example, in 2012, it was indicated that floods had caused an annual loss of up to 12% of maize in the southern part of Malawi and drought destroyed 46% of the maize crop

(Shumba et al., 2012). A study by Msowoya et al. (2016) predicts that there will be a 14% decrease in maize production by mid-century and 33% at the end of the century in Lilongwe District which is the largest maize growing district. Maize is Malawi's staple food that is grown during the rainy season. Rain fed agriculture will decrease food production and hence there is a need to invest in various farming technologies that are climate compatible, for example irrigation farming, growing new varieties of maize, crop diversification and natural moisture conservation strategies (Msowoya et al., 2016). Malawi being one of the poorest countries with limited resources to implement the proposed technologies, it is very likely that smallholder farmers will struggle to be resilient to climate variability. Malawi and many countries in Southern Africa have adopted conservation agriculture to adapt to droughts and erratic rainfall even though other studies reveal that there is need to adjust conservation agriculture depending on agro-ecological system (Thierfelder et al., 2016).

Floods have led to displacement of communities, loss of life and assets, and have contributed to reduction of community resilience in Southern Africa, including Malawi, (DoDMA, (2012), 2015; ODI and CDKN, (2015); UNDP, (2012)). According to Magis, (2010) community resilience refers to '*the existence, development and engagement of community resources by community members to thrive in an environment characterised by change, uncertainty, shocks and unpredictability*'. Community resilience and community adaptation to various climatic shocks differ according to the communities' priorities (O'Brien and Wolf, 2010). This suggests that farming communities would have different adaptation strategies to fishing communities. Furthermore, their work suggests that communities with different socioeconomic status and perhaps culture, values and community myths, will have different coping and adaptation strategies.

This thesis also examines how communities who live in the flood prone areas cope and adapt to the floods by exploring existing opportunities within the flood prone areas that enhance their livelihoods. This thesis also addresses the existing gap in literature on how communities are coping and adapting to the rapid, unprecedented and complex environmental changes (O'Brien and Selboe, 2015c)

In flooding areas of Urban Lagos, Nigeria, it was revealed that women in low income households are more vulnerable than men and women in the middle and high social classes (Ajibade et al., 2013). In Nepal, women were more affected by the earthquakes than men (Shakya, 2016). Among farming households in flood prone areas, women are also more vulnerable than men (Enete et al., 2016). Bee (2016) indicate that understanding the gender dimensions of vulnerability helps researchers and practitioners to understand further the context of vulnerability and thus lead to more appropriate adaptation initiatives. Cutter (2017) advocates for more and explicit research and publications on how women and children are affected by the social and environmental injustice and particularly gender in vulnerability and climate adaptation within and among the vulnerable communities. In addition, understanding gender roles would enhance the effective implementation of adaptation programs that would like to empower the most vulnerable groups.

In Iran, a study on the capacities of women in disaster management systems reveals that women play an important role in managing household chores and family livelihood, including taking care of children and cooking during and after disasters (Sohrabizadeh, 2016b). Participation of women during implementation of adaptation programs is important because it empowers them within their social-cultural and economic context to avoid misunderstandings that distract effective adaptation (Ibid). Gender relations, social power relations and knowledge processes influence women's perception of environmental changes and determines how they respond to environmental and social risks (Bee, 2016). This suggests that women in particular should be given attention in adaptation programs because of their important role at household level how they are heavily affected by disasters. There is a need to understand the roles of women in context to find a means of empowering them and equipping them to be able to deal with disasters.

Reyes and Lu (2016) indicate that women provide food, keep up hope for the family, take care of the sick or injured members of the family therefore women's roles before, during and after disasters exceeds those of men. Furthermore, women from low income groups and single parents are more heavily burdened than other women (Ibid). During floods and other crises, male farmers usually migrate in search of better livelihood leaving women with children at home, where the women become responsible for household

and agriculture activities (Khapung, 2016). Female farmers have limited access to agriculture extension and training programs whilst the male farmers are well exposed and actively participate in the agriculture extension programs as household heads (Mehar et al., 2016). This presents an example of how inequalities in exposure, access to resources, vulnerability, opportunities and capabilities are usually gendered and political in nature hence different groups of people are affected differently and adaptation measures should thus reflect this social differentiation, as it shapes adaptive capacity (Afriyie et al., 2017 and Madhuri, 2016).

In flood prone areas, the capability to evacuate during a disaster is highly gendered as it is highly determined by the cultural constraints in female mobility and lack of physical skills and strength, in addition to various gender roles (Chung, 2017). These findings indicate that masculine strength is often greater than that of women, meaning that they can lack the capacity to escape floods on time. Furthermore, Neumayer and Plümper, (2007) indicate that when floods occur the number of women who die is more than the number of men and that floods reduce the life expectancy of women in flood prone areas. Although there is great variation from situation to situation, past research has indicated that women within flood prone areas have less capacity to cope with the disasters due to a combination of demographic, emotional and social factors that characterise them (Chandra and Gaganis, 2016). These studies suggest that gender disparities should not be overlooked in vulnerability and adaptation studies. Furthermore, they suggest that understanding vulnerability using a gender lens is critical to understanding what factors exacerbate vulnerability amongst women living in the flood prone areas and also how adaption programs can be designed and implemented to purposefully address the gendered vulnerability.

Violence against women has been shown to increase in disaster-stricken communities, even though in most cases, these incidences are not recorded, investigated or shared, exacerbating vulnerability of women in these areas (Sohrabizadeh, 2016a). This suggests that in some cultures women are often disadvantaged in terms of exposure to new skills and are oppressed in terms of gaining appropriate knowledge and skills that might empower them. In a study involving fish farmers in Northern Thailand, Lebel and Lebel (2016) reveal that financial stability plays a significant role in the interactions between attitudes, analysis and emotions in making climate change decisions that are risky. This suggests that financial stability ensures right and effective adaptation measures regardless of gender, race and class (Godfrey and Torres, 2016). In Pakistan, high education status in women reduces health related sicknesses and underutilisation of health facilities in flood prone areas, emphasising the role of women in promoting good health in flood prone areas hence reducing their vulnerability to the effects of flooding (Sadia et al., 2016). The extent and context within which the women are disadvantaged need to be unpacked to help guide policy makers and development practitioners who are working on adaptation programs, in order that these programs have a meaningful impact on the lives of the most vulnerable.

The distinctive role of women in flood prone areas and the gendered dimension of vulnerability to floods, including emotions and attitude towards vulnerability to floods, illustrates the complexity of vulnerability and therefore how important it is to facilitate effective adaptation in flood prone areas. This thesis therefore explores the ways in which gender affects vulnerability and local adaptation in flood prone areas to illustrate the need for effective transformation in understanding vulnerability and addressing adaptation

issues which are differentiated based on local power dynamics and politics around gender, culture, class, attitude, perceptions and partly emotions.

2.2 Adaptation to Climate Variability, Including Floods

Globally, it has been recognised that developing nations are more vulnerable to the effects of climate variability because they do not have adequate expertise and finances amongst other things to deal with for example, floods, droughts, dry spells, strong winds and earthquakes (IPCC, 2013). As a result, a plea was made in 1992 to developed nations to assist developing nations through financial and technical support, including humanitarian aid in times of disasters to ease the burden of managing disasters (UNFCCC, 1992). Through the global conventions on climate change, such as the UNFCCC, The World Conference on Disaster Risk Reduction, amongst others, global and national policy on climate change and disaster risk reduction have been formulated. These climate change and disaster related policies were formulated to guide implementation of adaptation programs at international, regional and local level and to guide policy formulation at those same levels.

The National Adaptations Programs of Action (NAPAs), and national climate change policies for participating countries were formulated after the Kyoto protocol in 1997. During the Kyoto protocol, some developed countries committed to reduce the production of greenhouse gases in order to reduce global warming and the associated effects of global warming. The countries that ratified the Kyoto Protocol in 1998 were encouraged to develop the National Adaptations Programs of Action (NAPA) highlighting the major climate change effects that the particular countries experience. In addition, the NAPAs were to indicate how best the countries were going to deal with the climate change effects in targeted areas following a thorough risk assessment at national level (UNFCCC, Conference of Parties 3). However, due to climate variability, the intensity of extreme weather events became so severe such that other disaster related institutions were established in order to help to manage such disasters.

In 2005, parties that signed the disaster framework formed national disaster management policies with guidance from the Hyogo framework for Action (HFA) 2005 -2015; in order to reduce vulnerability to disasters and make certain that vulnerable populations are protected by their states. During the convention, it was evident that developing countries were struggling to cope with the disasters due to inadequate financial and technical capacity (UNISDR, 2005). As a result, developing countries were advised to conduct disaster risk assessments at national level to specifically identify disaster prone areas to relocate vulnerable communities to safer areas (Ibid).

In 2015 the Sendai Framework for Disaster Risk Reduction: 2015 to 2030 was formulated and adopted by interested countries (UNISDR, 2015). The framework highlights areas that needed to be adjusted following a thorough assessment and evaluation on the Hyogo Framework of Action, 2005 - 2015. The global perspectives of vulnerability, adaptation and resilience have been translated into national and local policies that have been guiding the government, stakeholders and partners in the development and implementation of climate change adaptation and disaster risk reduction production (Ibid). At the global level through the UNFCCC, joint efforts are encouraged to mitigate climate change effects through commitment to minimising release of carbon and other ozone depleting substances, and planting trees for carbon sequestration amongst others with substantial funding provided (Simoes et al., 2010; Hof et al.

2010). In addition, O' Brien et al. (2012) emphasise the need for a transformational change in the way adaptation should be approached by creating appropriate adjustments in leadership, learning, innovation and adaptive management in order to address complex effects of climate variability.

At international and regional levels, discussions on vulnerability, adaptation and resilience have been taking place through various conferences organised by the

United Nations Framework Convention on Climate Change, (UNFCCC), and followed by the establishment of the International Human Dimensions Program on Global Environment Change (IHDP) in 2005. IHDP is an international, interdisciplinary non-governmental science programme that is dedicated to initiate, promote and coordinate human dimension research of global environmental change. Vogel (2006) notes the significance of the programme in bringing interdisciplinary experts to tackle vulnerability to global environmental changes and suggest that it is a good way of enhancing effective adaptation to environmental changes. The interdisciplinary aspect of vulnerability also suggests that there are several ways of coping and adapting to climate variability, including floods.

The human dimension in dealing with climate change effects has enhanced the development of climate change adaptation policies that mitigate climate change effects in a way that enhances livelihoods of vulnerable populations. The interdisciplinary approach also has resulted in development of disaster related policies that integrate the management of disasters with disaster risk reduction strategies and mitigation measures that focus on the most vulnerable populations at both international, national and local level. In addition, there have been risk assessments to find out means of reducing vulnerability of populations at risk and provide support to enable them to adapt to the environmental changes to become resilient in the long term (United Nations Office for Disaster Risk Reduction, 2001).

Adaptation to climate variability, including floods has been romanticised]. O'Brien and Selboe (2015c) argue that adaptation has been presented as a problem that can be solved by technical expertise and yet the realities indicate that adaptation is a complex process that is linked to identities of the affected people, politics, power, values, beliefs and world perceptions on adaptation. The authors furthermore illustrate that the realities suggest that technical expertise alone can never solve adaptation challenges, but rather a combination of personal, political and social change depending on the spatial locations and how all these factors interplay (Ibid). As presented earlier on, several studies indicate that local adaptation is necessary to reduce vulnerability to floods. Shackleton et al., (2015) emphasise that research on barriers to adaptation needs to start asking why these barriers emerge, how they work together to shape adaptation processes, who they affect most, and what is needed to overcome them. This research therefore unpacks how various factors interplay in the flood prone areas and also explores the barriers and limitations to effective adaptation that emerge in the flood prone areas.

At national level, after the development of the NAPAs, various programs have been designed and are currently funded by international organisations, both government and non-governmental organisations, companies and other civil society organisations. The donor community include United Nations, World Bank, African Development Bank, (AfDB) Oxfam, Irish Aid, European Union, United States Development Agencies, Scottish Government, Department for International Development (DfID) amongst others. The funding from these organisations is directed to vulnerable communities through

bilateral aid, directly to the government accounts in developing countries, or non-governmental organisations and civil society organisations working in the developing countries.

There are several structures through formal and informal institutions through which development aid, humanitarian aid and other forms of support are directed to vulnerable communities. However, debates continue on how effective these national and local institutions are to develop and implement the climate change adaptation programs that will reduce vulnerability of the communities and empower them to be able to effectively cope with and adapt to the effects of extreme weather events (Baudoin and Ziervogel, 2017). A study conducted in South Africa (part of Southern Africa as Malawi is) reveals that the local institutions, despite having such an important role in climate change adaptation, do not have adequate skills in resource and project management; they also lack network skills that would help them to partner with other organisations in order to work as a team (Ibid). This study emphasises the need for additional skills that go beyond managing the flood itself to partnerships in order to effectively adapt to climate variability. This thesis, explores other factors that help communities to adapt to floods and make climate related decisions beyond the flood management knowledge. Manuel-Navarrete and Pelling (2015) emphasises that the politics of transformational change in different spatial locations needs to be explored in order to understand the power dynamics and decision-making processes in various places.

Several case studies conducted in vulnerable communities suggest that community adaptation programs prioritise short term challenges whilst indirectly ignoring the sustainability of such interventions (Ensor and Benger, 2009; Ludi, et al., 2014). Community-based adaptation has been defined by Reid et al. (2009) as a community-led process which is based on the priorities of the communities, their knowledge, needs and capacity. Communities are not homogenous, hence there is a need to examine how projects impact various groups in these communities, for example women, youth, elderly, the poor, orphans, people living with disabilities and many others. Blaikie (2006), amongst other scholars, illustrates how community based natural resource management as a concept and theory in forest management yields different results in different countries (Malawi and Botswana) and how the implementation and success is differentiated based on particular political, power dynamics and socio-economic relationships within the different settings. In addition, it is evident that success of the program is based on the agendas of the organisations who initiate and implement it (Ibid). There is a clear generalisation on the definition of resilience by international donors rather than the actual definition of what resilience means to the differentiated affected communities. This implies that some interventions are imposed on the affected communities based on the priorities of those who see the needs and problems from outside the communities. There is also a need to understand the perspectives of those whom these adaptation programs are designed to benefit and whether or not the targeted social group benefit from such projects. It is important therefore to unpack critical elements of local and community adaptation based on actual community problems and proposed interventions using political ecology theory to understand how community-based adaptation can reduce vulnerability to climate variability in a sustainable manner that will enhance local resilience to climate variability.

Households in Nigeria for example, communities cope with floods by selling their assets, borrowing loans to diversify their livelihood, migrating to other places where they can work to get money to sustain their livelihoods, utilising support from social networks and following new farming methods and technologies

(Enete et al., 2016). Critically assessing the coping mechanisms, selling assets to cope with disasters seems a very good strategy in the short term, whilst it creates vulnerability to the households in the long term. In addition, relocating to other places during flooding also does not offer long term solution. This thesis therefore explores the most reliable adaptation strategies that the smallholder farmers have being relying on over the years in order to understand how adaptation practices have changed over time and how the smallholder farmers themselves have transformed over the years due to climate variability.

Dodman and Mitlin (2011) reveal the need for development practitioners to contextually understand and incorporate political structures, culture, power and gender dynamics in their development plans to adequately and effectively address issues that are affecting climate vulnerable communities. Understanding vulnerable communities is vital because meaningful adaptation has to be designed in context in order to help the communities that are affected by climate variability. This suggests that there will also be sustainability of the projects after the project implementation period is over. Furthermore, it is important to understand the extent of losses, level of vulnerability and flood coping strategies in developing countries as it will shape the future of specific, strategic and effective adaptation strategies (Enete et al., 2016). The lack of this understanding will result in unsustainable interventions that will be costly and not accepted within the communities that such interventions are meant to assist. This thesis therefore unpacks the context of vulnerability, how it is differentiated and various ways in which the affected communities monitor the floods and cope with floods.

2.3 Flood Monitoring and Politics in Flood Prone Areas

Flood management consists of various assessments including hazard, vulnerability, exposure, risk, early warning system, damage and risk mitigation planning (Rahman and Di, 2017). Rahman and Di (2017) suggest that there is a relationship between several factors that determine vulnerability and adaptive capacity of vulnerable communities. However, the study does not explicitly indicate how these factors interact to create vulnerability. Instead, it focuses on major factors that exacerbate vulnerability to floods and not adaptive capacity issues, including flood monitoring. Firstly, authors suggest that tropical countries have high flood risk and low financial and institutional capacity to afford ground-based monitoring of rainfall and river discharge, hence are more vulnerable to floods (Rahman and Di, 2017). Most developing countries use remote sensing which is sometimes not adequate enough to provide timely early warning information that led to timely evacuation and planning in most cases. Remote sensing provides information in changes in the soil moisture content over time and is usually used to determine and predict flash floods.

However, remote sensing technology is not affordable to all countries. Some countries; in particular developing countries, have inadequate capacity to obtain updated remote sensing technology and space technology therefore flood management in developing countries will remain a challenge (Rahman and Di, 2017). Raju et al., (2016) indicate that remote sensing technology has advanced and is providing all the relevant information that would enhance effective planning for flood management. The soil moisture levels that are depicted over time predict the changes in soil moisture thereby predicting flash floods and floods in flood prone areas (Ibid). It is clear that flood management requires a huge investment in order to obtain effective early warning information that will reduce the effect of disasters, including floods. In flood prone areas however, where this research took place, communities use their local knowledge to

monitor floods. In addition, the meteorology department does not have adequate finances to procure advance weather monitoring equipment. This thesis therefore informs flood monitoring research on how floods are monitored locally and how the current flooding trends require a change even in ways in which floods are monitored at local level in order to cope with the floods effectively.

Remote sensing is an option for most developing countries; however, it depends on the willingness of the ruling governments to prioritise spending on the flood management in the national agenda. Affordability of the technology in this case is subject to various factors, including, but not limited to, national earnings and taxes, which suggests that flood management is also political. In Ghana for example, the government authorities do not actively stop people from settling informally in flood prone areas even though the authorities do not invest in flood mitigation measures in those areas (Amoako, 2016). The government's priority is to win votes from people who live in the flood prone areas (Ibid). This is the political nature of ruling governments where the focus is to remain in power, regardless of their obligation to make certain that people are safe during the floods. This also suggests that the ruling government benefits more from allowing people to live in flood prone areas because it gets more votes from the people who live there without being responsible for disaster risk infrastructure. This is a political strategy which is socially unjust to people who live in the flood prone areas. Although political and economic dimensions of governmental decision-making may differ drastically from context to context, these findings indicate how governments in some developing countries prioritise their agenda to win more votes during elections. These findings also suggest that there is a lack of proper discussions between the government and communities that are affected by floods. The people who are affected by the floods are not given an opportunity to negotiate for government led services to reduce their vulnerability to floods. As indicated earlier on, vulnerability to disasters is also socially constructed and influenced by political relations and other socioeconomic factors (Methmann and Oels, 2014). The lack of dialogue and poor government priorities in developing countries exacerbate vulnerability of those people who live in flood prone areas. This thesis reveals how political decisions and public disaster policies interplay together with other social and economic factors in the flood prone areas in order to understand the complexity of monitoring the floods and local adaptation in those areas. This thesis acknowledges the differences and complexity in governance institutions at different levels, government, community and household level. Some adaptation initiatives are delivered through government departments and established non-governmental and civil society organisations whilst other local adaptation practices are implemented by communities themselves through their particular norms, beliefs and culture. Therefore, further studies, including this research in different socio-economic, political, cultural and geographic settings will facilitate substantiated debates on vulnerability and local adaptation under various institutional arrangements in context.

2.4 Barriers and Limitations to Effective Adaptation to Climate Variability

'*The adverse effects of natural hazards on people do not only lie within the hazard itself, but derive from the position of these individuals within social, economic and political relations*' (Methmann and Oels, 2014, p278). Methmann and Oels (2014) indicate the main factors that put vulnerability and local adaptation in context. This thesis unpacks these social, economic and political factors in context in order to understand the dynamics of vulnerability and how the various factors affect local adaptation. Islam et al., 2014b; Jones and Boyd, 2011; Urwin and Jordan, 2008 stress that unpacking how and why each of

those underlying factors affect vulnerable communities would inform climate related policies, reduce vulnerability to climate variability and promote successful implementation of adaptation programs at local level. In addition, various scholars emphasise that understanding the complexities of vulnerability and local adaptation in context would promote transformational adaptation which is context specific and would effectively address adaptation challenges thereby reducing vulnerability to the negative effects of climate variability (Manuel-Navarrete and Pelling, 2015; O' Brien et al., 2012; O'Brien and Selboe, 2015a, 2015b, 2015c; Pelling, 2010; Pelling et al., 2015).

In some developing countries, climate change and other national policies are poorly mainstreamed during implementation of projects and programs (Stringer et al., 2009). Lack of comprehensive policies at national level results in many policies that become difficult to be mainstreamed (Ibid). Some of the most important issues that need to be addressed by such policies are neglected such as the flow of money and other livelihood benefits, who is affected more, why they are more vulnerable than others, who is responsible to benefit from the implementation of such policies, under what agreed criteria and justification for purposeful exclusion (Shackleton et al., 2015).

Malawi has many policies that conflict with each other. For example, the agriculture policy promotes farming close to water sources for irrigation purposes whilst the water policy indicates that farmers should not farm close to water sources to avoid water pollution and environmental degradation around the water bodies. (Government of Malawi, 2010). The inconsistency in the policies has brought confusion amongst the public and those that facilitate the implementation of development projects. The lack of clarity on such policies also affects the implementation of adaptation projects and in some cases also exacerbated exposure to floods due to soil erosion and degradation near the river banks.

According to Pasquini et al. (2013), there are various factors that affect the mainstreaming of climate change issues some of which include lack of knowledge and understanding of climate change issues and lack of political will by those in authority at both constituency and local government level in Southern Africa. Globally, the focus and priorities set by ruling parties determine the major support from the national budget and other resource allocation. The national budgetary allocation towards a particular theme is where more funds at national level are allocated to the theme of interest at a particular point in time (Nagoda & Nightingale, 2017). This mainly depends on the priorities of the current presidents and/or ministers although some governments have more decentralized power structures than others. This also suggests that in some cases environmental issues are not given a priority by most politicians because most politicians focus on issues that will give impact or results in the short term so as to win people's favour and votes. Many environmental projects will usually yield benefits in the long term. For example, planting a tree will take a number of years before benefits are realised. Due to this, they are not given a priority amongst ruling governments as well as the majority of people who have crucial needs that need immediate interventions (Saito, 2013). Inter-ministerial coordination supported by the highest levels of government is more relevant to the success of mainstreaming and integrating climate change issues into the national development priorities Ibid). This also suggests that if inter-ministerial coordination is supported, district and local coordination will also be improved since these local institutions generate from the line Ministries. Therefore, this argument indicates that proper coordination is relevant to enhance effective implementation of adaptation projects at local level and programs at national level.

Kosamu (2013) states that there are inadequate human and financial resources to support climate change adaptation programs in most developing countries. Not many people have the adequate skills, qualifications and experience in climate change adaptation programs hence lack effective delivery of significant contributions and outputs in climate change programs. This is in relation to cases where practically, modern science and technology methods and mechanisms are being applied as opposed to the local/ indigenous coping strategies. In Malawi, there is also little or no interaction and collaboration between climate change stakeholders such as NGOs, Civil Society Organisations and the government as evident during disaster needs assessment and response which results in lack of collective commitment in implementing climate change adaptation programs (DoDMA, 2015b). Furthermore, the post disaster assessment reveals that collaboration in disaster related issues will enhance adaptive capacity in the flood prone areas by ensuring that vulnerable communities are prepared for disasters (Ibid). However, the ability of the community or household to be able to cope with the floods or other disasters is complex and requires a multi-sectoral approach that empowers communities to be resilient to the floods in the long term.

Understanding the political and social barriers that have worked against successful adaptation to climate variability is vital to assist the government and other development actors to determine distribution of costs and benefits in society (Ensor et al., 2015). For example, global climate change effects that were addressed intrinsically exacerbated social injustice through the distribution of benefits and burdens between those who create the environmental problems and those who are burdened with the consequences of the environmental changes (Page, 1999). In addition, the social policies made create intergenerational injustice that will continuously disadvantage those who suffer more and who are not capable of dealing with the environmental changes (Ibid). The intergenerational injustice, unfair and injustice distribution of climate variability burdens and the misrepresentation of vulnerability to climate variability has been noted in the case of developing countries as they continue to suffer consequences of extreme weather events that they did not create, whilst the rich continuously pollute the environment and claim that carbon trading is a solution to the problem (Bachram, 2004). In such international policies lie the realities of social equity, role of power, responsibility and rights which reveal that poor communities will continuously become more vulnerable to climate change effects whilst the richer communities will continuously contribute to global environmental changes (Bohle & O'Brien, 2006). However, Maguire and Lewis (2012) indicate that there are attempts made to address such injustices even though it is still not clear how they could be explicitly tackled. This section therefore illustrate how dynamic and complex vulnerability issues are and how dealing with them is challenging at all levels. Solutions to climate related problems therefore should not be very technical because there can never be a single way of addressing the challenges, but rather a combination of technical, social, economic, political and cultural strategies.

The unclear ways of addressing such global injustice suggest that these inequalities will continuously be reflected in many adaptation programs hence creating a challenge in meeting the global, regional, national and local adaptation plans whilst exacerbating vulnerability to climate variability (Page, 1999). The author indicates that global justice does not exist and the social injustice that has been passed on from generations. The burdens of climate change will have to be shared with future generations inevitably and

hence a need to plan for future adaptations to reduce vulnerability. This argument presents a case that there is need to understand the vulnerability context now to plan better for future adaptation. In some cases, vulnerability is transgenerational and communities who are vulnerable now will continuously be vulnerable to climate variability, hence empowering them to adapt to climate variability is vital. These arguments both demand the need to understand and invest in climate change adaptation immediately to lessen the impact of climate variability in the future.

Environmental injustice has partly exacerbated vulnerability in communities that have limited capacity and influence to deal with the negative effects of environmental changes (Kirshen et al., 2012). In the case of East Boston Massachussets, a flood prone area, it was revealed that the communities experiencing the floods had no influence and knowledge on adaptation plans, but rather, all the decisions were made by institutions and people in authority (Ibid). This reflects some of the reasons that have caused failure in climate change adaptation programs in various communities and countries and also reflects on how vulnerable communities will remain vulnerable to climate change effects (Pelling, 1999). However, Sen, (2009) advocates that the vulnerable should be given a platform to be heard, the realities suggest that the governments and those that have the power, focus on political interests; therefore dialogue over social injustice does not realistically solve the problem (Tully, 2013). Power dynamics is therefore indeed one of the issues that needs to be addressed strategically at all levels to reduce issues of vulnerability to climate variability.

2.5 Conceptual Framework

2.5.1 political ecology theories

Blaikie and Brookfield (1987) stress that environmental problems are complex and hence require a deep understanding of the social and political setting in which the particular environment is surrounded. This led them to develop political ecology theories that seek to understand the dynamics and complexity of environmental problems in their specific social and political contexts. Neumann (2009) acknowledges that the phenomena under investigation can be very complex and interdisciplinary, hence political ecology is important because it involves a multiscale analysis that includes political economic analysis, historical analysis, ethnography, discourse analysis and ecological field studies. In a recent study, Middleton et al. (2018) use a political ecology lens to understand the relationship between migration, vulnerability, resilience and social justice that is associated with flooding in an environmental, social and policy context in Southeast Asia. The authors focus on ways in which floods play a role in the livelihoods of the migrants in Southeast Asia in contrast to flood related policies that refer to floods as a sole driver of migration (Ibid). This thesis focuses on environmental migration as an alternative adaptation strategy against floods by smallholder farmers that live in flood prone areas. The discrepancy on perceived vulnerability to floods between the public and people affected by the floods, and temporary migration during the flooding season has been investigated in the thesis.

This thesis presents an understanding of how vulnerability is framed based on self-perceptions that are differentiated based on locations, personal experience, age and gender, amongst other factors. This thesis also reveals the need for transformation in the way adaptation strategies and policies are perceived, designed and implemented to incorporate important aspects of culture, gender and power dynamics at

household and community level that form the basis of effective local adaptation to floods. This thesis also makes reference to other scholars that have done similar work adopting political ecology theories and ideas (Adger et al., 2009; Dallman et al., 2013) focusing on vulnerability to climate variability and the dynamics of local adaptation. In addition, the thesis builds on research conducted by scholars who have focused specifically on social transformation as an adaptive strategy that has potential to reduce vulnerability to climate variability (Manuel-Navarrete and Pelling, 2015; O' Brien et al., 2012; O'Brien and Selboe, 2015a, 2015b, 2015c; Pelling, 2010; Pelling et al., 2015). These authors stress the need to understand the politics and how decisions are made within the vulnerable spatial locations such as flood prone areas and areas that are prone to war and other socio-ecological disturbances.

The authors also emphasise the need to reduce vulnerability to climate variability through supporting appropriate sustainable livelihoods options that also enhance the adaptive capacity of the vulnerable communities. This thesis thus builds on the understanding that vulnerability to climate change is created by the interaction of social and natural systems, and that adaptation initiatives should incorporate cultural, political and social factors to reduce people's vulnerability to climate variability (Pelling, 2010).

This research addresses the gap in knowledge and understanding of how the historical, cultural, social, economic, environmental changes, power dynamics, and political factors have exacerbated vulnerability of smallholder farmers living in flood prone areas using Nsanje District as a case study. Pelling (1999:250) suggests that '*vulnerability for individuals and social groups has three components; exposure, resilience and resistance. These components are simultaneously the products of political and socio-economic structures and the capacity of individual actors and social institutions to adapt to hazard stress.'* The focus of this thesis is to understand the extent to which smallholder farmers are exposed to floods and the opportunities that lie within the flood prone areas that have shaped their livelihood options and survival during and after the floods. This study is important because it illustrates how climate related decisions are made by community members in the flood prone areas and how the discrepancy between public perceptions and self-perceived vulnerability has resulted into inappropriate policy options that do not reflect the extent, context and intensity of vulnerability to floods.

This thesis further seeks to understand why the smallholder farmers that live in flood prone areas are not able to cope with the floods in a way that their livelihood is not affected, despite huge investments over US$50 million in climate change adaptation initiatives by the government of Malawi and development partners including the World Bank, Global Environment Facility, World Food Program, Food and Agriculture Organisation, European Union and various United Nations departments (DoDMA, 2015a). This thesis explored how these smallholder farmers understand local adaptation projects, what it means for them and what is involved. In addition, to understand and learn from them the factors that would assist the smallholder farmers to be able to cope with the floods, recover after the floods and become resilient to the floods in the long term.

Pelling (2010) stresses that understanding the economic, environmental, political, technical, institutional, social and cultural transformations is vital to reduce complex vulnerabilities to climate variability. This thesis therefore provides a case study of how these multiple factors interplay in the flood prone areas to create, exacerbate and reduce vulnerability to floods.

2.5.2. The Local Adaptive Capacity Framework (ACCRA, 2010)

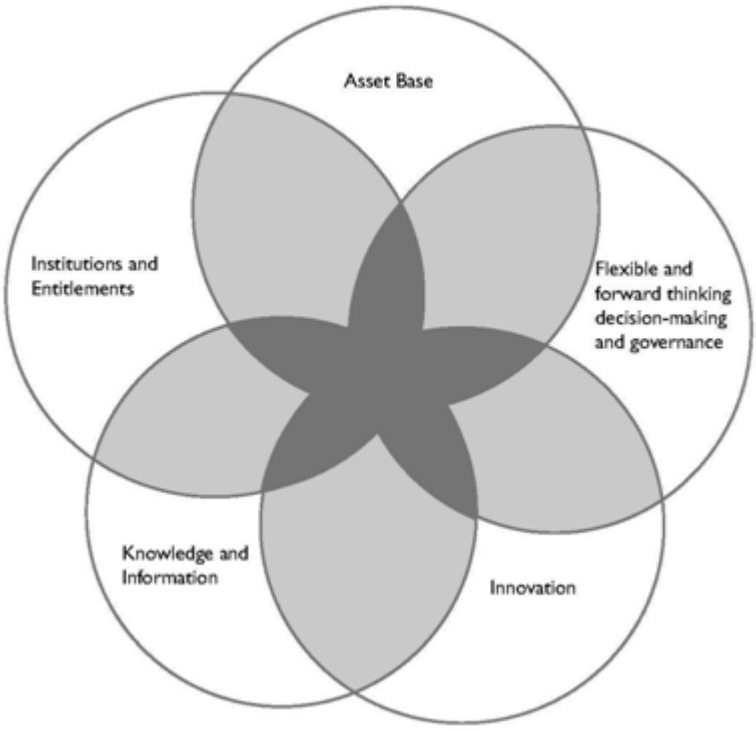

Figure 1 The Local Adaptive Capacity Framework (ACCRA, 2010)

Accessed at: http://community.accraconsortium.org/.59d669a8/research.html

The Local Adaptive Capacity Framework is similar to the adaptive capacity wheel, (figure 2) in that it acknowledges the relevance of resources in forms of assets. Assets are very important to enable the households and communities to cope with floods In addition, it acknowledges that information and knowledge facilitates learning and room for autonomous change which facilitates innovation in which the households and communities deal with the dynamic and complex effects of floods.All the frameworks therefore indicates that communities need to be empowered economically, socially and politically in order to effectively adapt to climate variability. The frameworks also illustrate that communities and households need a multidisciplinary approach in order to deal with the effects of climate change. Policy makers therefore need to understand the dynamic and complex nature of communities in order to effectively design and implement adaption programs that will reduce vulnerability to climate variability whilst enhancing the adaptive capacity of the households and communities.

The Local Adaptive Capacity framework, just like other adaptive capacity frameworks that measure and assess communities' vulnerability and adaptation, is important because it also helps researchers to understand what influences communities to adapt to floods (Adger et al., 2004). In Ethiopia, Uganda and Mozambique, the framework was introduced to measure how development interventions impact on adaptive capacity at the local level and it is mostly used by International Non-Governmental Organisations and other partners in development (Ludi et al., 2014). Usually, these assessments are done on formal institutions that govern communities and households.

Formal institutions enable access to various resources within the communities including land and water, and are partly held responsible for failure in adaptation. However, it is important to understand the systems in which the context or arguments can be made, based on the social, political and ecological factors. For example, in Nsanje District in Malawi, an irrigation scheme rehabilitated after participatory consultation has benefited one community and has exacerbated flooding problem in another community (Harrison and Chiroro, 2016). This presents a situation that needs to be considered when coming up with some of the adaptation and resilience projects as they might be harmful to other communities, exacerbating their vulnerability whilst economically empowering other communities. Perhaps this also suggests that there can never be a perfect adaptation option between the government and people who are affected with the floods, and among different communities in the flood prone areas. In some cases social injustice is inevitable when designing climate change adaptation programs because vulnerability is complex and linked to other areas geographically. Addressing vulnerability issues in one area might therefore unintentionally affect other people in other spatial locations. This thesis explores the dilemma that exists in the flood prone areas, the associated political and economic issues, how decisions are made, who is consulted, who benefits and the basic understanding of environmental and social management of risks and plans that are involved.

2.6 Chapter Summary

This chapter has presented an exploration on the impact of floods on sustainable development, who is affected, why they are affected and how adaptation can be designed in order to reduce vulnerability to floods . Based on the review, it is clear that vulnerability is multifaceted and is generated by multiple factors including biophysical, socio-economic, political, cultural beliefs and norms, and other factors that are specific to a particular setting.

This thesis uses Nsanje District to illustrate and understand what generates vulnerability in flood prone areas, to what extent people are vulnerable, who is the most vulnerable, why they are vulnerable and what currently is done in the areas to adapt to the disasters, including floods, including who benefits from such interventions and whether or not the interventions are bringing change in the lives of the vulnerable people. My research further unpacks local adaptation in context, to further investigate challenges in local adaptation and opportunities that lead to successful local adaptation in flood prone areas using the one case study. Apart from adding knowledge to the wider literature on the impact of floods on sustainable development, vulnerability to floods and local adaptation, the research findings will critically reflect and inform climate and disaster related policies. This research therefore can be used to enhance effective design and implementation of climate change adaptation projects in flood prone areas.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter describes the research methodology under which this research was undertaken 'Importantly', this chapter describes the data that was collected. A mixed method approach was used to collect data relevant for this research. This is where both quantitative and qualitative data is collected to understand various research topics in context (Teddlie and Tashakkori, 2009). I used a household survey, key informant interviews, focus group discussions and participant observations to collect data for this research. The chapter provides details of the type of data that was collected, how it was collected, why it was collected that way and how it was analysed in response to the research questions. study limitations are also highlighted to indicate the jurisdictions and boundaries within which this research was conducted, and within which its findings apply.

3.1. Research Design

In this research, I used a case study design to explain, describe and explore selfperceived vulnerability to floods and local adaptation in Nsanje District in Malawi, under an Interpretivist epistemology at both household and community level (Crowe. et al., 2011 and Yin, 2009). Interpretivist epistemology is an understanding that there are several realities depending on the context through which the reality is constructed and that the reality can never be objectively determined and perceived (Berger and Luckman, 1967; Carson et al., 2001; Hirschman, 1985; Hudson and Ozanne, 1988; Lincoln and Guba, 1985; Neumann, 2000). Hudson and Ozanne (1988) define *ontology* as the nature of reality that is characterised and influenced by several factors within a particular setting and context. *Epistemology* on the other hand has been defined as the way in which the reality is captured by a researcher within the particular settings that forms a reality, it is a relationship that exists between the researcher and the situation on the ground that form a reality (Carson et al., 2001).

The interpretivist epistemology approach helped me as a researcher to understand how the communities living in flood prone areas perceive their vulnerability to floods. The social realities obtained enabled me to also understand how the communities have been able to cope with the floods for several decades and why they have refused to relocate to safer areas that are not prone to flooding. In my research, it was important to understand the motivations, significances, explanations and other subjective experiences that are applicable and make sense to the smallholder farmers that live in the flood prone areas. This research therefore needed to adopt the interpretivist approach it did and acknowledge that these findings are true to the communities living in the flood prone areas without any preconceived beliefs and ideas that could have shaped the findings.

3.2 Population of the study

The research areas for the study were sampled out of the whole community that live in the flood prone area through a community mapping exercise. The Community mapping exercise enabled me to identify

areas that experience severe flooding to determine the study sites to focus on. Furthermore, data collection involved a series of key informant interviews, focus group discussions and a household survey where a unique sampling process for each method was undertaken, as will be discussed later on in the chapter. Firstly, I will provide details of the community mapping exercise.

3.2.1 Community Mapping

I conducted a community mapping exercise at the District Council Office, with the help of the District Civil Protection Committee (DCPC) members, including the District Disaster Risk Management Officer, The Environmental District Officer, The District Environmental Health Officer, The District Social Welfare Officer and Area Civil Protection Committee representatives. The Area Civil Protection Committee representatives are based in the flood prone areas and more knowledgeable on the maps and environmental changes that have occurred due to the floods.

The aim was to identify, with reference to the district maps, areas of high vulnerability in relation to exposure to floods and droughts, from their experience of flood response. This exercise was done during the first planning meeting to enable me to allocate resources accordingly and also to inquire how the areas where accessible. On the maps, 46 group village headmen, under traditional authorities, Mlolo, Mbenje, Ndamera and Nyachikadza were identified by United Nations Disaster Assessment Coordination (UNDAC) team as being at risk of floods because of their location

However, even though all the areas are affected by the floods, the magnitude of the impact is not the same, according to DoDMA (2012), and it was also indicated by the DCPC Members. A combination of community representatives and district officials working in disaster prone areas was essential because there was a discussion on which areas where worse off and better off, also adaptation activities that are being implemented in the areas to reduce vulnerability to floods. During this mapping exercise, the places where the people who are affected by the floods migrate temporarily during the floods were indicated. This exercise helped me to strategically identify participants for key informant interviews to understand the interdependence between the smallholder farmers living in the flood prone areas and those living in upland areas.

Based on the community mapping, the DCPC also indicated non-governmental organisations that are working in the areas to reduce the vulnerability to floods. From the community mapping, it was shown that there were several climate change adaptation initiatives in TA Mlolo that included irrigation farming; whilst there was none in TA Nyachikadza. According to the DDP (2010), the areas that are under TA Nyachikadza (Part of the Blue Box on Map 3) were declared uninhabitable due to the severity in exposure to floods. The area is surrounded by a marsh hence with the frequent flood experiences, smallholder farmers were advised to relocate to upland areas through DoDMA Officials, to which they have refused.

The DCPC members were able to indicate some areas that have been complying by adopting new conservation agriculture and climate change related activities more than other areas. This, according to the committee, enables them to identify new areas that need interventions in terms of coping with the adverse weather effects. In addition, it enables them to monitor progress and identify gaps in their approaches. This exercise was beneficial to me because it enabled me as a researcher to have an idea of

the places I was going to conduct my research and also clarified and deepened my understanding on some of the community behaviours that I noted whilst collecting data.

The community mapping exercise was also done to explore and relate what communities in flood prone areas do to reduce their vulnerability, how they become innovative and what decisions they make in relation to reducing their vulnerability. This was done to be able to compare what is documented in district documents such as the socio-economic profiles and development plans with what I would find in the field. Since 46 Group Village Headmen and their people were affected by the floods, I had to determine the actual research sites which also determined who would be eligible to participate in the research. At District level, the areas are divided into

Traditional Areas, which are then sub divided into Group Villages and then Villages.

In other words, a Group Village comprises of several Villages, a Traditional Area comprises of several Group Villages and a District comprises of several Traditional Areas.

3.2.2 Sampling Procedure

A purposive sampling was used to determine which individuals and households were to participate in the research. According to Palinkas et al, (2013); Palys, (2008) and Suri, (2011) purposive sampling is a sampling technique whereby the sample is chosen based on a certain criteria determined by the researcher's interest, in order to obtain applicable data in relation to significance, meaningful understanding and depth of the researched matter. Out of the 46 Group Village Headmen, 10 Group Village Headmen were identified as being severely hit by the floods based on the flood assessments and extent of exposure to floods. I then narrowed my research to focus on communities living in these 10 group village headmen, based on the guidance and prior knowledge obtained from the DCPC members. The same applied for Nsanje District as described in the previous section. However, not every community living in the 10 Group Village Headmen participated in the survey.

Neither did all the communities along the Shire River in Traditional Authority Kunthembwe participate in the research. I had to determine the actual sample size for the research, according to the different methods that were undertaken.

3.2.3 Sample size

In terms of sample size, (Table 3) this research involved 227 households during the household survey and 12 focus group discussions (FGDs) with communities in addition, 57 key informant interviews (KII) were conducted. I acknowledge that the sample size varies with the type of research and size of population so there can never be a specific and fixed size. The household survey was conducted before the 2015 floods whilst the focus group discussions and key informant interviews were conducted after the floods. The floods came earlier than expected, but only after the sampling processes identified those to take part in key informant interviews and focus group discussions.

Table 2 Sample Sizes for the Different Methods Employed in this Research

Research Sites	**Household Survey Participants**	**Focus Group Discussions**	**Key informant Interviews**
Mlolo	52	3	10
Mbenje	52	3	10
Ndamera	52	3	10
Nyachikadza	52	0	10
Kunthembwe	19	3	10
Key Stakeholders	0	0	7
Total	**227**	**12**	**57**

I reviewed literature for sample sizes for various research as per academic researchers' experience and expertise. There has been debate on the sample size that should be considered adequate for qualitative research depending on the type of study. Whilst Charmaz (2006) indicated that 25 is the right size, Green and Thorogood (2004) suggested that a sample size of 20 should be adequate. Ritchie et al., (2003) suggested that a sample size close to 50 should be adequate because with such a bigger sample, one is certain that all the information that was expected to be captured will have been captured. In addition to this, they claim that it is very likely that no new concept will have been missed from all the 50 research participants (Ibid). Sandelowski (1995) suggested that if the sample size for research is relatively big and complex, the research presents a new and richly textured understanding of experience. Based on this understanding, I am confident that the data for this research that has been collected using mixed methods; through household survey, key informant interviews, focus group discussions and participant observation, has adequately answered my research questions.

3.3 Data Collection

Baxter and Jack (2008) indicated that a case study is an approach that helps a researcher to explore a phenomenon within its context, using a variety of data sources. In order to understand the cases thoroughly, data was collected through both quantitative methods, namely a household survey and qualitative methods, namely key informant interviews, focus group discussions and participant observations (Crowe et al.,. 2011). I used multiple sources of data collection so that I should also increase credibility of my research, also referred to as methodological triangulation in social science research. Methodological triangulation is a way in which multiple data collection methods are combined when collecting the same type of data, at different places and at different times in order to increase the strength of the information that is being collected in social science research (Barbour, 2001; Mason, 2002; and Stake, 1995).

In this research, people living in three communities participated, two communities in Nsanje, (The Northern, top part of Nsanje district, TA Mlolo and Mbenje and the Southern, bottom part of Nsanje district, TA Nyachikadza and Ndamera). The comparative study was very important because it helped me to deepen my understanding of the different cases and be able to relate, compare and contrast critically (Miles and Huberman, 1994). Understanding how communities perceived their vulnerability to floods and how they cope with the environmental changes in different contexts also deepened my understanding and application of political ecology theories. However, in each community, based on the communities' definition of wealth status, the households were grouped according to their socio-economic status. There were three groups based on whether the households were 'very poor', had 'average income', or were 'relatively rich' using participatory wealth ranking which is described in the next section, under household sampling.

3.3.1 Quantitative Data

Quantitative data for this research was collected through a household survey using a semi-structured questionnaire i.e. household survey (Appendix 1). However, the questionnaire also contained a section where qualitative data was collected. This method was used to determine how communities perceive their vulnerability to floods, how they rank their risks in the flood prone areas and what they are doing to cope with the floods. This method was also used to explore livelihood options and community behaviours that needed to be deeply understood through participant observation, focus group discussion and key informant interviews.

3.3.1.1 Household Survey

A total of 227 households were involved in the household survey, with the help of research assistants, whose positionality is described under the research assistant section. Research assistants spent 45 minutes to 1 hour with each household. A total of 52 farming households participated in each of the 4 traditional authorities in Nsanje, District; traditional Authority Mlolo, Mbenje, Nyachikadza and Ndamera. In Traditional Authority Kunthembwe, only 19 households participated in the survey. The sample size was smaller than the other traditional authorities in Nsanje because firstly, the affected area was relatively smaller than the one in Nsanje District. Secondly, the survey was conducted to understand how the communities living in this different catchment of the Shire River Basin, Middle Shire perceive their vulnerability to floods and how they adapt. This area is also prone to floods, the communities have never experienced severe floods before January, 2015. Communities in Traditional Authority Kunthembwe experience droughts and had started practicing irrigation agriculture in 2013. Usually, there has been excessive run off from this area that contributed to flash floods in Nsanje (UNDP, 2009). However, in January, 2019, communities lost all their farm land due to the rainfall, which according to the data I collected in Nsanje had contributed to the change in the soil structure. Therefore, I decided to also conduct a household survey to understand how communities perceive their vulnerability to floods and learn from them of initiatives they are taking to mitigate the effects and manage the flood risk for sustainability. In addition, I also wanted to find out how they perceive environmental degradation, flooding and agriculture.

Specifically, the household survey was used to collect information on how households understand the incidents of floods and droughts, what causes them and what the associated effects are. The survey was

also used to obtain information on how households identify risks and the associated security issues in terms of their perception. This enabled me to understand the motivation and willingness to participate in activities that reduce their vulnerability. I only referred to activities that are specifically designed by the government and partners in development to increase household resilience to floods and droughts. Households were also asked to weigh the risks which they identified in relation to the issues they face, and rank each risk on a scale that ranges from very mild to extremely severe. Furthermore, the individuals were asked how as a household, they come up with decisions that reduce their vulnerability to floods and droughts, the assumptions they make, and who they involve and consult. There was a sampling process that was used to determine who was to take part in the survey as described in the next section.

3.3.1.2. Household Sampling process

The list of households periodically affected during the floods in the targeted areas was collected at the Office of Disaster Management Affairs under the Nsanje District Commissioner's Office in Nsanje. I also followed the same procedures in Blantyre District. The list was then verified at respective traditional authorities through the Area Civil Protection Committees (ACPC). The list was verified to make sure that it was up to date since there are some families/households that relocate to other areas for various reasons, including, but not limited to marriage and job opportunities. In addition, I also wanted to be certain that the people that were indicated on the list indeed live in the various villages as sometimes, the lists are altered for political reasons for distribution of campaign and other materials. The other times, the lists are combined strategically to facilitate implementation of donor projects and other requirements during relief distribution. The list is based on number of households that form a particular village in order to facilitate the distribution of developing projects and humanitarian aid. A household comprises of individuals that feed from the same pot and consider themselves to be a family.

I used stratified random sampling to identify research participants in all the three groups. The stratification was important so that I should collect comprehensive data from all the social classes to understand how the households perceive their vulnerability and local adaptation. The variation in perception and local adaptation strategies was also important to understand how the social inequalities and social injustice play a role in perceived vulnerability and local adaptive capacity to the floods, droughts and extreme weather events. In addition, the inclusion of all social groups ensured inclusiveness of research participants and eliminated social biases that naturally exist in rural communities.

Within each group, 17 households were selected at random. In order to do this, all households in each of the three groups was allocated a number which was written on a small piece of paper. The pieces of paper with numbers on them were rolled and placed in a small basket. Some members of the community, including the chief, and area and village committee members then picked the small pieces of paper. Only those households whose numbers were picked were eligible to be interviewed and were interviewed after obtaining their consent. Out of the selected 17 households per group, survey participants alternated between males and females to balance the gender of the research participants to get an equal number of males and females. However, there were 109 Males and 118 females who contributed to the households. There were more female research participants because there were more female headed households in the poorest of the poor groups than male headed households. Out of the 227 households, 70 households were poor based on the participatory wealth ranking exercise; from which 40 were female headed.

3.3.1.3 Data entry and analysis

I used the Statistical Package for Social Sciences (SPSS) package for data entry and simple analyses, mainly frequencies, mean, mode and simple correlations. I designed the data entry template and together with a data entry clerk, entered all the quantitative data that was collected during the household survey. Continuous data was summarized using measures of central tendency such as means, mode, median and range. Categorical data was summarized using frequency, counts and proportions. Inferential statistics was also used sparingly especially when applying correlation analyses. The findings that were drawn from the sampled research participants were used to interpret certain actions and describe relationships that exist between different factors and processes in the flood prone areas.

Using NVIVO, I grouped the responses from open ended questions to identify themes that were critical during the research to enhance my understanding of how smallholder farmers perceive their vulnerability to floods and how they are coping. I also used NVIVO to identify themes from the qualitative data that was collected through key informant interviews and focus group discussions. The full details on qualitative data and analysis is given in the next section.

3.3.2 Qualitative Data

Qualitative case study methodology enables researchers to study complicated phenomenon within their context using descriptive data (Sandelowski, 2000, 2010). Guiding questions (appendix 2) were used to guide the FGD and KII. The aim was to collect similar information but at different levels to enhance triangulation of the data. The focus in this case was on collective community perception to floods, droughts and extreme weather events, and local adaptation. In addition, I wanted to explore community responses to floods and droughts, and the social networks that help communities to be resilient to floods and droughts as part of adaptation strategies. The aim was to be able to differentiate the responses between households and communities, and also to triangulate and deeply understand some of the information that was collected during household interviews and participant observation. For example, to deeply understand why temporary migration as opposed to permanent migration is relevant in the flood prone areas. In some cases, some of the information collected during the focus group discussion was even more deeply understood during interviews with key informants. More especially, information on historical contexts of the floods, environmental refugees, inter-dependence between communities living in flood prone areas and those living uplands, social networks, and transfer of knowledge and information between communities in relation to adaptation to floods.

3.3.2.1 Key informant interviews

I personally conducted 57 KII with selected small participant and key stakeholders at the District level, using a question guide (Appendix 3). KII took approximately 1 hour and 30 minutes. At the community level, I interviewed, 1 traditional authority, 2 village headmen, 2 members of the civil protection committee and 5 smallholder farmers living in nearby communities, not affected by the floods themselves but have the interdependence relationship with the flood victims. For the key stakeholders, I interviewed 1 District Commissioner, 1 Disaster Management Affairs Officer, 1 Environmental Officer, 1 member of the District Civil Protect Committee, 1 District Agriculture Development Officer and 2 officers working

in relief agencies, International Non-Governmental Organisation with a focus on climate change. I also interviewed a total of 23 participant who had been experiencing the floods for over a decade and have lived in the flood prone areas since birth. All these participants were identified strategically through the sampling process. In terms of gender, there were more males than females and partly it was because the males held the strategic positions that I targeted. In addition, even at community level influential people that were identified and those holding positions in civil protection meetings were men.

3.3.2.1.1 Key Informant Sampling

A snowballing process was used to come up with key informants that participated in the interviews based on professional expertise and community knowledge on vulnerability to floods and local adaption (Denscombe, 2003). At District level, the list of key stakeholders was strategically identified based on the positions that the individuals held. The positions had an implication on the significant role they played in disaster related issues, including the floods. I also used my personal professional knowledge through my previous role as a civil servant in the area to identify some of the key people that were interviewed at professional level.

At the research sites, the first people to be contacted were the chiefs and civil protection committee members who gave me names of participants who could provide the information that I was looking for. The selection of the communities was made based on the communities experiences and understanding of the floods and local adaptation in the community. Since the wealth and social classes played a major role in the research, these people directed me accordingly, so I had a balance of views from different social classes in my research sites.

Through the process, communities living in neighboring villages to the research sites were also identified as playing a major role in local adaptation to floods. It was indicated that the communities in the neighboring villages have extensive social networks with the flood victims and provide shelter to the flood victims during the floods. Information collected at the district council also indicated that there is an interdependent relationship between the affected households and those from neighbouring villages. Therefore, I included key informants from the neighbouring villages to the research sites to have a deeper understanding of how these different groups of participants relate and how they depend on each other. In addition, I wanted to understand if over the years they also have made deliberate changes in their livelihood and adaptation initiatives due to noticeable environmental changes. I also wanted to investigate if there are any long term strategies that are in place in terms of the support they offer to the flood victims, in addition to the temporal, short term strategies. Additional information to deepen my understanding was collected through focus group discussions with selected communities.

3.3.2.2 Focus Group Discussions

A series of 12 focused group discussions were conducted with smallholder farmers living in the flood prone areas. Three focus group discussions were conducted in each of the four study areas using guiding questions (Appendix 2). The discussions took approximately 1 hour. The aim was to determine how the communities collectively perceived their vulnerability to floods and how they were adapting to floods locally at community level. The first group comprised of men only, the second group comprised of women

only and the last group comprised of youth (a combination of both young men and women, with deliberate efforts to balance gender representation). The gender groups, of male and females, were separated in order to give women room to discuss the vulnerability issues freely. Due to the patrilineal tradition, in most cases, women do not raise their concerns in the presence of men and are not comfortable to disagree with men's point of view. The youth groups however comprised of young men and women because due to the nature of their age, less than 35 years old, in most cases young women are able to talk freely even in the presence of young men unlike the older generation. The focus group discussions were conducted with 9 participants in 1 women-only focus group discussion in Nsanje and 11 participants in the remaining 11 focus group discussions.

Only participants that were randomly selected through a list that was collected at the district council and verified at the TA participated in the focus group discussion.

3.3.2.2.1 Sampling Process

For the FGDs, a mixture of participnts in different social classes were identified through purposive sampling. The FGDs enabled me as a researcher to understand some community approaches and concepts that might have been missed out during the household survey and key informant interviews but were relevant to understanding participants self-perceived vulnerability to floods and local adaptations using the political ecology theoretical framework. In addition, I also observed some of the behaviours in the flood prone areas to have an understanding of the study areas and context in which they were applicable.

3.3.2.3 Participant Observation

Participant observation refers to studying households within a community, whilst living with them, with the aim of understanding the meaning behind their actions (Easterby-Smith et al., 2008). The participant observations lasted two weeks in each community in order to deepen my understanding in terms of their livelihoods, their perception towards vulnerability to floods and droughts and how they make livelihood decisions. Furthermore, it enabled me to understand how participants see their world and how they construct their reality, which then enabled me to understand the findings and discuss in context (Thorne, 2009).

3.3.2.5 Data Entry and Analysis

For all the qualitative data, I firstly gathered the data based on the different methodology. Using mostly NVivo 11, I entered all the data that I collected based on the themes that I had identified i.e. self-perceived vulnerability, vulnerability and risk, crop production and post-harvest handling, and local adaptation. For the responses under the themes, I provided different codes and colours to distinguish the different responses under sub-themes and also to enable me to isolate the responses for analysis. Based on the various responses in different codes, I then grouped similar responses to create other emerging themes from the findings which were the novel contributions of my research.

3.4 Data Analysis Strategy

Data analysis for this thesis was led by the research questions that formed the basis of the research. In addition, literature review on differentiated vulnerability and local adaptation in various spatial locations in developing countries partly influenced the way the results and discussion chapters were shaped. Firstly, it was based on how the communities who live in flood prone areas frame their vulnerability to floods. The data under this theme was further grouped and interpreted based on various factors that influenced the differentiation in the responses on how communities perceived their vulnerability to floods, thereby also influencing how they frame their vulnerability to floods, as it is presented in Chapter 5. This analysis adds more knowledge on differentiated vulnerability, mainly illustrating that self-perceived vulnerability is also differentiated therefore self-perceptions at all levels should be incorporated in climate related decisions, policies and programs in order to design programs that would adequately reduce vulnerability to climate variability.

Secondly, the data was analysed to explore the various factors that motivated the communities to continue living in the flood prone areas despite the evidence that the areas are exposed to floods hence their livelihood is at risk. This analysis, that is presented in Chapter 6, further illustrates that in some cases, communities also benefit from living in flood prone areas therefore disaster related policy makers should be aware of such benefits and formulate disaster related policies that support the positive attributes rather than only focusing on the negative aspects. UNISDR (2005, 2015) focus on the safety of the communities that live in disaster prone areas and suggests that relocation to safer areas is the best solution. However, in some spatial locations, promoting best livelihood options within the flood prone areas reduces further vulnerability to climate variability and is the preferred solution by the communities that are affected by the disasters.

3.5 Limitations of the study

Although there was much effort to make certain that all study limitations were taken into considerations, there are a few limitations that need to be highlighted. Firstly, the research being cross-sectional in nature, there are chances that the information collected and explained represent the perceptions of the communities during the particular research period, and may not be true for the other times. This research therefore does not depict changes in community's perception over a period of time and cannot guarantee that there can never be any changes in due course. This study therefore is limited in terms of continuity and following up of participants to deepen the understanding of the continuous effect of climate variability in perceived vulnerability, and behaviour change in addressing the floods, droughts and dry spells.

Secondly, there was a gap during the data collecting period, due to floods in some research sites. As a result, some areas became impassable hence we could not visit some of the farms and areas that are extremely exposed to flooding to have an idea of what it means to be farming and living in areas that are extremely exposed to flooding. However, the data that I collected provides evidence that vulnerability to floods is subjective and that self-perceived vulnerability is influenced by various factor and processes that interplay within the flood prone areas. In addition, my study illustrates that local adaptation is complex and that communities cope with floods differently. My study provides an overview of how smallholder perceive their vulnerability to flood and how they are coping with the floods. However, I acknowledge

that the extent and context of vulnerability and also the dynamics of local adapting in my study might be different in other areas.

Thirdly, I acknowledge that this thesis is based on my understanding of political ecology and 'that therefore the study findings might reflect different arguments from studies that would be conducted using different approaches. In addition, the context within which the issues of gender, culture, vulnerability and local adaptation are discussed in this thesis are subjective to the context of vulnerability to floods and local adaptation in flood prone areas in Malawi; therefore I acknowledge that there are other cases that would reflect these issues differently. The findings from this research however adequately reflects that vulnerability in flood prone areas is exacerbated by floods and other factors that interplay within the areas. It is important therefore to integrate such factors during design and implementation of adaptation programs that aim at reducing vulnerability in flood prone areas.

Fourthly, I would like to acknowledge that this research has limitations in the way male and female research participants' emotions are being discussed because I did not focus much on the emotions, but rather the actual responses between the two groups of people during and after flooding which are related to emotions. In addition, the issues of false consciousness in relation to some behaviours that are gender related, myths and beliefs in the case studies can be debatable.

3.6 Chapter Summary

This methodology chapter has provided detailed information on how the data for the research was collected and the analytical processes that were undertaken. It has described how the quantitative and partly qualitative data was collected through household surveys and how most of the qualitative data was collected through key informant interviews, focus group discussions and participant observations. Furthermore, the chapter details how SPSS and NVIVO were used to aid analysis of the data that was collected. Finally, the chapter presented the study limitations which provide an indication of the context within which the study was conducted and therefore the context within which findings are valid.

CHAPTER FOUR:

RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents wider public's perceptions of the vulnerability of the smallholder farmers who live in flood prone areas. It also presents findings and discussion on how communities living in flood prone areas in Nsanje frame their vulnerability to floods based on their own perceptions. This self-perceived vulnerability to floods is differentiated based on geographical location and position, personal experience, frequency of the floods, age, gender and emotions. The chapter also presents the factors that have contributed to some communities being more vulnerable to the floods than others, including low socioeconomic status, lack of social networks and inability to cope with the floods.

Combest-Friedman et al., (2012) emphasise that households that live in flood prone areas are aware of the increase of rainfall and changes in the intensity of floods hence these people are aware of the associated risks. The important debate however is whether households in the flood prone areas are able to cope with the floods and will be resilient to the floods in the long term. Demski et al. (2017) explored the extent to which personal exposure to floods influences how the affected people perceive their vulnerability to floods and therefore engage in climate change adaptation and mitigation initiatives. Their findings indicate that statistically, those that experience floods have high risk perceptions and are likely to be involved in adaptive actions (Ibid). In some cases, however, Demski et al. (2017) found that there was no difference in perceived vulnerability to floods between those that are affected by the floods and the public. It is important to unpack the extent to which perceived vulnerability to floods is similar between communities that are affected by the floods and those that are not affected within a particular context in order to critically explore the similarities and differences that exist. The fact that in some cases personal exposure does not influence perceived vulnerability to floods suggests that in those instances, communities can continue living their normal lives without taking appropriate actions to adapt to the environmental changes they experience. This chapter therefore seeks to illustrate and understand how communities perceive their vulnerability to floods and to critically examine the factors and processes that influence the perceived vulnerability to floods in order to understand the link between self-perceived vulnerability and local adaption to floods in context.

Communities in Nsanje emphasised that floods are part of their lives and livelihoods. The smallholder farmers have been experiencing floods for over six decades, during which they have on occasions had to relocate in the flooding season. It is important to note however that the discrepancy in the number of years that communities have been experiencing the floods is due to lack of specific secondary data in the district council and national documents. The period in the documents is estimated to be just over two decades when the communities in research sites indicate that it is over six decades. This in itself highlights the importance of conducting the research in the selected research sites and to some extent contributes to the discrepancy in perceived vulnerability to floods.

This chapter illustrates through qualitative data and quantitative data that there is a need to understand and contextualise self-perceived vulnerability to floods and sustainability The responses from the communities elucidate the realities of vulnerability to floods and point out to the factors that can assist the government of Malawi in the design and implementation of climate change adaptation strategies that reduce vulnerability to floods for people that are affected in various locations. In addition, the insights shared in the district-level interviews reveals that most of the time, the media does not report on the most important topics that form the livelihood of the communities living on the flood prone areas. From the data, it is evident that it is vital to understand the complexity of the lives of the people living in the flood prone areas to successfully address climate change vulnerability and adaptation challenges at policy, program and project level.

4.1 Public Discourse towards communities that Live in Flood Prone Areas

Interviews with key stakeholders, including government officials, journalists, officials working in related organisations and some communities living in upland communities indicated that the communities living in flood prone areas are stubborn and enjoy receiving humanitarian aid and support during the floods.

'*Communities that live in flood prone areas are stubborn. They deliberately refuse to relocate to upland areas because they know that the government will always support them during floods.'* (KII #1, January, 2023). In addition, the government officials, who work at the District Council, indicated that '*We have told them to move upland several times, but they do not move. We do not know how they want us to tell them. Information was officially sent in 2020 and we remind them every now again, they are very stubborn'* (KII # 53, Nsanje, June 2022. However, another key informant indicated that '*to be honest, no one understands these* communities*, maybe they need to be approached to really find out why they do not want to move. The government is concerned with their safety but the* communities *do not want to move, it is as if they are all mentally ill, how can someone not understand that they are supposed to move for their own good*' (KII # 27, May, 2015). It is evident therefore that little is known about the processes and factors that influence the communities to continue living in the flood prone areas which influences public perception towards the vulnerability of communities that live in flood prone areas. This often results in misconception and inappropriate adaptation strategies which do not incorporate the realities of vulnerability in the flood prone areas.

Some officials working for non-governmental organisations and civil society organisations working in the area, and others who visited Nsanje to support the people affected with the floods, indicated that they have been supporting the affected people for over 5 years but that despite this support, that the people are becoming more vulnerable to the floods, rather than better able to cope with them. '*I remember the first time I came to support the people affected with the floods here; there were only a few people who were affected and many areas that have been affected now were not affected then. That time, some of the people who were affected then have been affected again now. They were told to relocate that time but they never relocated. I personally cannot understand why they choose to suffer during floods when they could be in safer places*' (KII #26, April, 2022). In addition, another official indicated that '*our organisation has been on the government's side, advising communities to relocate to safer areas. They have refused to relocate. I believe it is because they know that during the floods, the government, humanitarian organisations and other well-wishers would always send relief items to support them, they are so dependent on the humanitarian aid. I wish they could love their lives more and relocate*' (KII #18, March, 2022).

Another key informant also indicated that '*to some extent, I think organisations and the people themselves have contributed towards their continuous stay in the flood prone areas, as a humanitarian worker, I get busy when such incidents happen. These people in their situation have created work opportunities for us, without them, we could be jobless. The other part of us feels they should indeed move, whilst the other part of us is glad that we have work to do. It is a complicated situation*' (KII #46). It is evident that communities living in the flood prone areas are not given an opportunity to express themselves in order to be understood how they perceive their own vulnerability to floods and even why they communities are motivated to live in the flood prone areas. The lack of knowledge on the communities' perspectives has created a general misconception of the livelihood of these communities.

One participant indicated that '*it is unfortunate that some people out there think we love and enjoy receiving handouts in form of humanitarian aid and support. I wish we could be given an opportunity to tell them how humiliating it is to be in camps, where there is no personal freedom and the support we get*

is not enough for our families' (FGD #4, March, 2022). These words accentuate the point that there is a meaningful gap in knowledge of perceptions towards vulnerability between the communities living in flood prone areas and the policy makers and also key stakeholders that are implementing disaster risk reduction and climate change adaptation programs. The results from the household survey indicate that all the smallholder farmers that participated in the research would like to be supported in a way that they become independent, rather than being dependent on humanitarian aid. The proposed strategies included being supported with farming inputs and tents to put up temporary structures whilst they work towards settling down after the floods. Whilst policy makers are determined to move the communities from the flood prone areas, communities themselves indicate that they are comfortable in the flood prone areas based on reasons that are valid to them.

The misunderstanding between these parties creates questions on who these policies are designed for if the ones that are affected by the policies have a different perception. The next section presents how communities living in flood prone areas perceive their own vulnerability to floods. In addition, it highlights how their perception to floods is differentiated and what factors influence the different perceptions. communities frame vulnerability to floods as part of their livelihood which is contrary to how the public presents it, as a fatal risk that requires permanent relocation to upland areas that are safe.

4.2 Self-Perceived Vulnerability to Floods

According to communities who live in flood prone areas, their perspective of the floods is influenced by the location where they live, their personal interaction with the floods, age, the timing and severity of the floods, loss of life, emotions and gender. The next sections expand on these factors to present an understanding of how they influence self-perceived vulnerability to floods in the flood prone areas.

4.2.1 Self-Perceived Vulnerability to Floods by Location

Some communities derived their self-perceived vulnerability based on the location where they live, which they referred to at different scales, from the district level to village level. communities in Nsanje are more vulnerable to floods. '*usually, the floods just sweep off the top soils, our homes are intact and not all our crops are destroyed, unlike the smallholder farmers in Nsanje, we hear they lose their crops and even homes are destroyed*' (FGD #11, TA Kunthembwe). According to the household survey, all the respondents in Nsanje were aware that communities in Nsanje are more vulnerable to floods than them for various reasons. During focus group discussions, some of the indicators of vulnerability that were mentioned included the extent of damage caused by the floods in Nsanje as well as the way they are exposed due to the location, Lower Shire Valley. A traditional chief in Kunthembwe explained that '*We are lucky that we are upland, our friends from the Lower Shire Valley are in big trouble, all the water from upland ends there. I hear they benefit from the fertile soils after the floods but they lose everything. We are less vulnerable than the communities in Nsanje*' (KII #51, TA Kunthembwe).

In Nsanje, during household survey, key informant interviews and focus group discussions, communities said that they are aware of their vulnerability to floods due to their geographical position. A lady from TA Mlolo, who is also a Civil Protection Committee member explained that '*we are more vulnerable to floods because our friends in the upper Shire Catchments have cut down trees hence contributing to soil*

erosion and which makes water not to sink into the ground but run over the top soils during the rainy season. As a result, we are always the victims during the rainy seasons' (FGD 9, TA Mlolo).

Apart from the geographical position in Nsanje, these communities attribute their vulnerability to floods due to environmental degradation that has been caused and exacerbated by the smallholder farmers living in the upper catchment of the

Shire River. In addition, a male participant who is 75 years old and living in TA Nyachikadza in Nsanje District, indicated that they have become more vulnerable because of the changes in the rainfall patterns and amount. '*We have always lived close to the marshy areas all our lives and it is only recently due to changes in the way the rain is falling nowadays and the times in which the rainfall starts and end, also the amounts of the rainfall that we have been experiencing the disastrous floods frequently*', (KII #14, TA Nyachikadza). A combination of geographical position, rainfall patterns and environmental degradation in the upper shire river catchment has been indicated as causing communities in Nsanje to be more vulnerable to floods than in other disticts

Settling in flood prone areas, changes in land use and deforestation are some of the factors that have caused global vulnerability to floods (Kundzewicz and Kaczmare, 2000). These authors indicate that extreme hydrological events are also a natural phenomenon that will continue to occur regardless of all the underlying factors and suggesting that it is necessary to understand the extreme hydrological events and live with them (ibid). Over a decade, the data that I collected, in addition to other national documents that I reviewed indicate that although hydrological extremes occur naturally, changes in land use and deforestation in upper areas have exacerbated vulnerability to communities living in flood prone areas. Clearly, this indicates that vulnerability is more complicated with several factors that exacerbate it.

Different locations are affected differently by floods based on various factors. In 2000, it was indicated that the fight against floods and droughts by all the stakeholders in the Mediterranean region had not been successful (Kundzewicz and Kaczmare, 2000). There are various reasons that have resulted to the communities not being able to cope with the floods and droughts in various places. The need to further understand the context in which communities are failing to cope with the floods and droughts helps to scrutinise the challenges and therefore often offers appropriate strategies that are strategically targeted to deal with the underlying challenges. Kundzewicz (2003) stress that higher and more intense precipitation is being observed around the globe and that some places are more exposed to such precipitation than others hence create a difference in the levels of vulnerability. This is still the case in many parts of the world where vulnerability varies depending on the extent of exposure to the rainfall and the effects. Adaptation strategies that aim at reducing the effects of floods should not adopt a one-size-fits-all approach. The approach should instead be on specific and appropriate measures that are applicable to the region, country, district, area and village in question.

The more that communities are exposed to floods, the more they struggle to cope with them (Paul and Routray, 2010). In Bangladesh, people who live in areas that are not heavily affected by floods and live in better socio-economic conditions are likely to cope with the floods better than people who are more vulnerable to the floods and are worse off in terms of their socio-economic conditions (ibid). In the Philippines, households are aware that there have been an increase in rainfall, rainfall variability, an

increase in the intensity and frequency of storm events (Combest-Friedman et al., 2012). However in terms of perceived risk to floods, their results indicate that spatial location and resource dependency are the factors that determine their perceived risk to floods, whilst the social economic conditions do not have any influence (ibid). Nevertheless, social economic conditions are factors that characterise households and communities and therefore very critical in adaptive capacity (ACCRA, 2010). However, the extent to which self-perceived vulnerability and social economic conditions influences perceived risk to floods needs to be unpacked in context in order to provide contextual evidence of the claims. To some extent, individuals make decisions on their vulnerability and how to cope with their vulnerability partly based on the available resources. For example, in my study area, the poorest of the poor indicated that they are more vulnerable to floods because they do not have an alternative source of livelihood, neither do they have valuable assets that they can sell during or after a disaster to help themselves. The rich however, people whose economic status is high based on their local indicators, indicated that they are exposed to the floods but are not very vulnerable. They explained that they have valuable assets which they rent out and sell during and after a disaster for their survival hence their livelihood is not hugely affected.

However, Combest-Friedman et al. (2012) concluded that spatial location is the most significant factor that determines how households perceived their flood risk to household assets, but not perceived risk to their households. The spatial location determines how these households will be affected in terms of losses and damages to their household assets such as blankets, cups, pots and furniture. This scenario suggests that the people that are affected by the floods are not concerned about their lives being in danger and their livelihood but rather the assets they own which could be swept away or damaged by the floods. This could be another factor that motivates the households to continue living in the flood prone areas. My results on the contrary suggest that spatial location only partly influences how smallholder farmers perceive their risk and vulnerability to both household assets and livelihood therefore indicating the dynamics and complexity of self-perceived vulnerability as will be discussed in the following sections.

Another man who before the January 2019 floods was categorised as a middle class farmer indicated that '*Floods have been part of us for a very long time, however, with the recent experience of floods in January, 2015, we feel helpless. Floods are now posing a real threat; all our assets have been destroyed, including our farm land. Previously, we were rejoicing when floods came because we could get fertile soils that enhanced our agricultural production. During the January, 2019 floods, our soils have changed and we do not know what to grow, this is a big blow to us*' (KII #20, TA Mlolo).

The results indicate that with the increase in the intensity and severity of floods over time, the smallholder farmers have realised that the floods put both their household assets and livelihood at risk and that they are more vulnerable to floods. The results further suggests that perception can change over time depending on the extent of risk and severity of the floods that determine the extent to which the smallholder farmers become vulnerable to floods. In this case, the findings indicate that floods damaged the farm lands in 2019 unlike the previous years where only household assets were damaged. These findings also suggest that the extent and type of damage varies depending on the geographical positions where communities that are in low lying areas suffer more and differently than those in upper areas. The variation in how vulnerability is framed suggests that vulnerability to climate variability is heterogeneous and dynamic

and therefore that adaptation plans and strategies must acknowledge and respond to that if they are to enhance sustainable local adaptation in a dynamic environment.

The comparison in the case studies clearly indicates another aspect of vulnerability whereby communities are exposed to floods due to heavy rainfall, environmental degradation and excessive runoff in other parts of the country. Contributing to wider literature, the study context illustrates how complex vulnerability issues are and that there are various levels of exposure that need to be explored in various locations to understand vulnerability levels. This understanding is needed further in order to design effective local adaptation strategies that are more relevant and suitable to the affected areas and affected communities. In addition to this, personal experience, based on age and exposure to extreme floods was observed as another aspect that influences vulnerability to floods, as discussed next.

4.2.2 Self-perceived Vulnerability Based on Personal Experience of Interactions with Floods

The findings illustrate the way that communities have personally experienced floods, in terms of the actual suffering and number of times they have experienced severe floods, have also contributed to the way communities perceive their vulnerability. The previous section described vulnerability at a wider community level based on spatial location, whilst this section describes individual experiences and those at the household level.

'*We have been experiencing floods for over two decades, we have survived the worst floods, we are exposed and more vulnerable to floods. Floods have become part of us, we prepare for the floods, experience the floods and over the years, we have come up with strategies that will reduce the negative impacts of floods*' (KII #9, TA Nyachikadza). Key informant #9, who has lived in traditional Authority all his life and is over 75 years old indicated that floods are not a new phenomenon and that they have been experiencing disastrous floods several times in his life time.

In another key informant interview, an elderly man said '*Floods are indeed an issue of concern, however, it is important to note that we do not experience floods every year. Over the years, the January 2019 floods have been the worst. There are some years when we experience normal rains and we do not move. Floods are just one of those occurrences that happen once in a while so we are not too scared of them. We live a normal life.*' (KII #2, TA Ndamera). The participant emphasised that the personal experience through interaction with floods over the years has created an opportunity for them to get used to the floods and learn to live with them. The communities stressed that floods are not an extra-ordinary problem but rather, a problem that is location specific and has been incorporated in their social environment. This statement suggests that personally, some smallholder farmers have accepted the floods as part of their lives and though admitting that they are affected sometimes, it has ceased to be a major concern that they would worry about every year. This aspect of how communities frame their vulnerability based on their personal experience to floods is important because it illustrates the type of attitude the people have towards the floods therefore suggesting preferred form of intervention that should be advocated for.

Personal experience of floods influences the way the affected people perceive their personal vulnerability and risk to floods, in addition to their perceptions to climate change and the way they respond to floods (Demski et al., 2017). However, Demski et al. (2017) also highlight that there are some cases in the United

Kingdom whereby some individuals who have never experienced a disaster before can perceive the vulnerability to disasters similarly to those that have experienced disasters (Ibid). These findings therefore suggests that there is need to understand ways in which personal experience affect people's perception towards floods and that such claims should not be generalised, but rather should be contextualised.

My research suggests that personal experience with the floods is significant in determining how the communities perceive their vulnerability to floods and that it is different from the public that does not experience floods. During household interviews, focus group discussions and key informant interviews, the communities were able to distinguish their self-perceived vulnerability to floods based on the different times and circumstances when they had experienced the floods, the extent of damage that was caused by the floods and the intensity of their vulnerability in all those times. In addition, this thesis overall suggests that apart from the actual flooding experience, there are several other endogenous and exogenous factors that have influenced the communities self-perceived vulnerability to floods as evidenced by another study.

In Chile, Lara et al. (2017) emphasise that spatial locations, timing of the floods, gender and environmental degradation in the upland areas influence how smallholder farmers perceive their vulnerability to floods. In context, whilst some factors and processes are relevant in some areas, these may be different in other areas hence the different factors that are being mentioned by different scholars to be influencing perceived vulnerability. The Nsanje case presents evidence of where location and personal experience influence self-perceived vulnerability to floods as will be discussed next.

In TAs Nyachikadza and Ndamera, the communities have been experiencing flood for over 2 decades, similar to TA Mlolo. However to them, as indicated in the quotes, floods have always been a part of their lives and they were used to them until the 2015 floods, which were different due to their timing and extreme nature. The disastrous floods came during the middle of the night. An old man indicated that '*We have experienced floods for a very long time and in all those times, we were able to relocate to neighbouring villages with our belongings in good time. The only difference is that this time, the floods came unexpectedly and at night. The whole area was flooded in less than 10 minutes hence we could not think, we struggled to save our lives and lost all that we had, our household items, farm produce and boats. It is as if we have lost our livelihood. We have no idea of where to start from now*' (FGD 1, TA Ndamera). The inability to prepare for the floods and relocate prior to the floods has changed the way in which some communities perceived their vulnerability to floods. This emphasises that self-perceived vulnerability to a risk is not constant, it changes over time based on the extent of personal exposure, the ability to prepare for the floods and relocate before the areas are flooded and associated damage to personal assets. Whilst some smallholder farmers indicated that floods are part of their normal lives, some of the key informant interviewees indicated that they are more vulnerable now and helpless after the January, 2015 floods.

Similar findings are reported in a study in Lagos city, Nigeria by Adelekan and Asiyanbi (2016). Their findings illustrate that each city is affected by climate variability differently even though they are all in the same country, implying that context of vulnerability and therefore adaptation needs and resources cannot be generalised and should never be uniform, but rather each case should be treated differently based on adaptation needs and personal interaction with the floods. This thesis emphasises the extent of severity of floods in different locations and therefore that vulnerability to floods differs based on

geographical settings. It also emphasises that the ability to cope with the floods and climate variability differs amongst different individuals based on their personal circumstances. The factors that cause vulnerability in the different settings can never be the same. The geographical boundary can go beyond cities/districts to as small as village level, as found in this thesis.

It is evident that in Nsanje District regardless of location and type of hazard, individual experience with the flooding situation is crucial in vulnerability and local adaptation studies as it builds self-perception to vulnerability and over time helps those that are affected with the floods to find ways of coping. However, it was also evident that people are used to the situation where they are able to monitor the floods and have enough time to relocate. In the event where they were not able to adequately prepare for the floods, they lost all their assets and some people lost their lives. This situation suggests that communities are used to certain ways in which flooding events occur and how they prepare for the floods. In the event where there is a slight change in occurrence, mainly the middle class communities and poor communities are disturbed and become more vulnerable unlike the perceived rich communities within the same locations. Over time however, this research would suggest that the affected people would similarly find a way of coping with the new form of threat. On the other hand, people who are not able to cope with the extreme floods, mainly the poorest of the poor and the elderly would be deterred from continuous exposure to a risk and choose to relocate as will be discussed in detail later on in the chapter.

During a focus group discussion with the chiefs and other influential communities that live in flood prone areas, it was clear that the some communities who are mainly old would prefer to relocate to safer areas due to lack of strength and capacity to escape during the floods. '*For some of us, we started relocating about 10 years ago. Previously, the floods did not come with much force hence we could still be in our homes during the flooding season. With time, we started relocating during floods with all our belongings, now the flooding 'style' has changed. Floods are coming with no notice at all, this is dangerous for some of us who are growing old now and we do not have enough energy to run or change strategies, relocation is better for us*' (FGD # 2, TA Ndamera). In addition, older communities indicated the same whilst the younger generation who were still productive and have experienced floods in various dimensions were still willing to continue taking the risk, indicating that the risk is more valuable that relocating to other places where their livelihood would be neglected.

In Malawi, Kakota et al. (2011) emphasise that the groups of people who are more vulnerable to climate change include the elderly because they are usually so poor with limited alternative source of livelihood and cash to sustain themselves during and after a disaster. In relation to my study therefore, the more vulnerable a particular group is to the floods in terms of age and inadequate capacity to cope with the floods, the more they are willing to relocate to upland areas permanently due to the hassles the vulnerable groups experienced during the extreme weather events. The self-perceived vulnerability goes beyond the individual experiences with the floods in relation to how they suffer personally and how as individuals, they are able to cope with the floods, over time and with age, to the frequency of the floods in the area.

4.2.2 Self-perceived vulnerability based on frequency and severity of floods and causing damage and loss of assets

During all the focus group discussions in Nsanje, it was indicated that there are differences in the timings of the disastrous floods that led to relocation in Nsanje District. During focus group discussions, communities that were relatively rich indicated that they do not perceive floods as a great risk to their lives and livelihood because of the variation in their occurrence. Whilst also indicating that there are other factors that influence their self-perceived vulnerability, smallholder farmers indicated that floods that cause displacement and damage to household assets and houses do not occur annually. '*Yes, we are vulnerable to floods. However, the vulnerability to floods is not something we think about every year. There are some years that go by without experiencing floods. That is why we remember that it is a problem during the years that we are displaced*' (FGD #3 TA Ndamera). In addition, another participant indicated that '*Floods are sometimes a problem. However, we do not consider it a major threat because it does not happen every year. If we were displaced every year, I think the way we think about our vulnerability to floods would have been different*' (KII #17, TA Mbenje). In Traditional Mlolo however, one of the chiefs said that '*to be honest it is during the recent years that we have now started considering floods as a threat to our livelihood. We experienced disastrously floods that led to displacement in 2012, barely 3 years later, we have also been displaced. It is now becoming an inconvenience to us and hence we need to seriously think of a permanent solution to avoid being displaced and losing all our assets*'. (KII #48, TA Mlolo). The responses from the different areas in Nsanje suggest that apart from spatial locations, the frequency of floods also influence selfperceived vulnerability to floods. This is very important because it also influences how farmers respond to the issues of floods and the attitude towards the urgency of some of the adaptation strategies that are advocated by the government and other stakeholders.

During the January, 2015 floods, all the smallholder farmers in Traditional Authority Mlolo indicated that they had become more vulnerable to floods than in the previous years because the soil structure had changed due to huge soil deposits. In addition, some communities whose soil structure had not changed indicated that they are more vulnerable to floods, but because their houses, farm products, households' items and livestock were washed away. '*This year, 2015, we have lost everything, we have nowhere to stay, our houses, household items and livestock were washed away, previously, we had time to rescue our household items, including farm products and livestock. Our houses would contain the water to a certain level during the floods, but would dry off after a couple of days. This year, there is nothing left after the floods, we have become more affected with the floods than in the previous years*' (KII #38, TA Mlolo).

The communities living in Traditional authority Mlolo and Nyachikadza are used to the floods as they have been extremely exposed to the disastrous floods over a long time. During flash floods, Traditional Authority Mlolo is the first to be affected, then Traditional Authority Nyachikadza due to the geographical position of these places. However, their perception to floods changes when floods bring unexpected results including changes in soil structure (In TA Mlolo in Nsanje) and washing away of farmland which leaves communities with no land suitable for farming. The results hereby suggest that some communities do not perceive their vulnerability to floods as a serious threat to them if their agricultural land is still suitable for farming. This, therefore indicates that self-perceived vulnerability also depends on the

significance and attached value to what has been affected. In this case, the farm land provides an area for farming which forms the major part of the community's livelihood.

In the areas that are heavily affected by floods, mostly in Traditional Authority Mlolo and Traditional Authority Nyachikadza, houses are strategically built with mud and poles to avoid huge losses during floods. The strategic adaptation brings another aspect of self-perceived vulnerability to floods that should be accounted for in adaptation strategies. In the situation where these smallholder farmers are requested to relocate to reduce vulnerability to floods, they have temporary houses built with mud and poles that are easily replaced. The damage of houses in the case therefore is not a significant loss to them, where as it is significant to the government of Malawi, that is responsible for infrastructure including roads and bridges.

These findings raise questions about who would actually benefit from the proposed relocation, the people who are affected by the floods or the government itself in terms of reduced pressure to offer support to the communities that are affected with the floods during and after the floods. During the key informant interviews, all the government officials that were interviewed lamented about the pressure that the government has during floods and after the floods due to inadequate funds. It is evident that with limited funding, the best option for the government would be for the communities that live in flood prone areas to relocate. However, this is contrary to what was evident during the research because many people would prefer to migrate only temporarily during the floods, rather than migrating permanently. In addition to this, the results illustrate that the adverse effects of floods on the people goes beyond the hazard itself to the interaction of social and economic factors within the system. Methmann and Oels, (2014) illustrate that that there are several factors and processes within a system that exacerbate vulnerability to climate variability, including social, economic and political factors. In my case studies, it was revealed that specifically, issues of gender influence how communities perceive their vulnerability to floods as discussed next.

4.2.3 Self-Perceived Vulnerability to Floods according to Loss of Life and Gender

Apart from losing agricultural land, loss of life during the floods also determines how smallholder farmers perceive their vulnerability to floods in flood prone areas. A participant in Traditional Authority Mlolo during the focus group discussion, a woman indicated that '*I have never experienced floods to this extent (January, 2015). My 3 children were carried away with the floods, I was helpless, for the first time I have realised that floods are dangerous and it is indeed dangerous to live in flood prone areas*' (FGD #8, TA Mlolo, April, 2022). Communities realise that living in the flood prone areas is dangerous after losing their loved ones. This statement suggests that previously, the danger of living in the flood prone areas was not considered seriously until the smallholder farmers witnessed loss of lives.

In an in-depth interview with a man from TA Mlolo who had lost a wife and 2 children, he indicated that '*I was deeply affected with the loss of lives of my family members, my wife and 2 children however, life must go on so I will continue farming there and live there because it is God's will that I have now lost my family members*' (KII #44, TA Mlolo). This statement further suggests that for some communities, it is not just the vulnerability to floods that is associated with the death, but rather powers that they have no control over, in this case, he mentioned God. The statement illustrates that perception to floods is

influenced by not only what is lost, but also the extent to which as human beings they have control over a situation and the extent to which they are able to cope with the emotions of losing household assets, family members and their farmland. The acknowledgement of the situation where communities realise that they have no control over nature poses an interesting debate in the prevention of disasters since in this case, they have a choice to either cope with the situation or do nothing about it and face the realities of environmental changes.

Some women were afraid to go back to the flood prone areas to avoid the trauma. In TA Ndamera during a women focus group discussion, all the women agreed to what another woman said that '*I have now realised that floods are dangerous and that living in the flood prone area is not ideal. With the way we suffered to get to a safer place this time, I strongly agree now to the idea of relocating. Floods are dangerous, they kill and taking chances is as if we are mentally disturbed*' (FGD #2, TA Ndemera). This suggests that emotions also play an important role in determining how smallholder farmers perceive their vulnerability to floods. In the case of the communities living in Nsanje, if it were not for the disastrous floods that caused death, all the communities would have still considered floods as part of their livelihood and not as a threat. During interviews and discussions, women showed and illustrated that they were heavily affected when they lost their family members during the floods, whilst men showed that they were dealing with their emotions in a way that was presented as another trauma as part of life. This might be taken to indicate that women can be more emotional in times of bereavement hence need more psychosocial and moral support where bereavement and trauma is involved in the flood prone areas. After the floods, during focus group discussions and participant observation, some women cried when they were explaining what they went through during the floods. Some women indicated that they were failing to sleep because of the memory of the flooding event, whilst none of the men I interacted with indicated that they had reached that extent.

Nsanje is a patrilineal society were the men are culturally perceived as being responsible to take care of the wife and children. The women relocate and stay at their husband's land and are culturally expected to be submissive to their husbands. The discrepancy in the findings on dealing with emotions will no doubt be influenced by culture and the responsibilities either part has to play in the society, and also the fact that some men cannot openly admit that they are heavily affected emotionally. In this setting, all the women indicated that they were struggling emotionally with the loss of their beloved ones more than the men since they had to continue managing the homes whilst the men were out most of the time socialising with their friends and drinking beer sometimes.

A study conducted by Lebel and Lebel, (2016) suggest that emotions are important in climate related decision making therefore they should be explored in order to understand certain behaviour within a particular environment. In Northern Thailand, women were perceived to be emotional and therefore struggled to make informed decisions when they were in an emotional state unlike men (Ibid). However, Lebel and Lebel, (2016) revealed that regardless of gender, emotions played a role in different decision making scenarios. This thesis illustrates that emotions are subjective and therefore should not be generalised based on gender, but rather to an extent within which an individual has been affected by an incidence and the realities that surround them. In flood prone areas and evacuation centres, despite being emotional, women play a major role in making certain that children and men are fed and all their

household demands are met. '*During floods, all the women have the responsibility to cook for their household members, fetch water for their household and do all their household chores. We force ourselves to be strong because there is no one who can help us. Some men usually go to see friends in nearby villages whilst for us, we have to be with the children and do all the chores*' (KII # 17, April, 2022). This reinforces the point that all women are not irrational but rather, many are responsible and know when to do what is expected of them, even during a crisis. For example, even after experiencing loss of family members during the floods and some struggling with their emotions, they were able to comfort their children who were also traumatised.

During participant observation in the field, the women who suffered loss would cry when their children are out to play but remained emotionally strong in the presence of other family members. After the floods, the affected households evacuated to designated evacuation sites where tents were assembled for shelter. During that time, many men could not be found in tents during the day, I was told that they were going out to chat and drink with friends during the day, every day. Whilst socialising with others was perceived as a way to deal with their emotions, women never had that opportunity due to their household responsibilities. Women had to stay around the camps to cook for their families, including their husbands, and to take care of their children amongst other chores. Women therefore experience tough situations and had to fulfil all the husbands and society's expectations in the home, regardless of their experiences.

Bee (2016) indicates that understanding the gendered dimension of vulnerability is relevant to design appropriate local adaptation programs that meet the needs of the communities that experience the disasters. In this case, understanding gender roles and responsibility before, during and after the floods is critical to providing specific, targeted and adequate psycho-social and emotional support to the vulnerable communities as well as guiding policy makers on the type of support that is needed and to whom, rather than generalising support to the affected people. Reyes and Lu (2016) highlights that women keep up hope for the family, care for the sick and provide home in the family. Afriyie et al. (2017b), Madhuri (2016) illustrate that different groups of people and genders are affected differently during floods. Women are emotionally stressed during and after the floods hence there is need to provide more psycho-social support to women who are bound to the evacuation sites with limited opportunity to visit friends and family members as per this thesis.

The sections on various factors that influence self-perceived vulnerability to floods partly explain why many communities have been living in the flood prone areas despite the associated risks. According to the household survey and key informant interviews and focus group discussions, communities indicated that they grow various crops and are involved in some small-scale businesses. These activities are part of their livelihood in the flood prone areas that is more valuable to them and worth the risk of living in the flood prone areas. In addition, the frequency of the floods is such that the flooding problem does not occur annually hence giving the communities confidence to continue living in the flood prone areas. Subsequent chapters in the thesis discuss how communities realised that there is need for more sophisticated early warning system to prepare them during flooding and are willing to cooperate with scientists, hydrogeologists and other professionals that can assist them in the design and implementation of an effective early warning system.

Officials working in government meanwhile need to understand how the affected communities are coping with the floods, identify gaps and challenges and be able to fill the gaps to achieve sustainable and effective adaptation to floods and other extreme weather events. Instead of insisting that the communities should relocate to safer areas, this research suggests that there is need to understand the complexities of vulnerability, adaptation and resilience. Inclusive and comprehensive vulnerability assessments and adaptation planning, design and implementation is necessary to effectively adapt to the floods and other extreme weather events. In TA Nyachikadza and some parts of TA Mlolo and TA Ndamera, the government stopped providing services to the communities because they were designated disaster prone areas and therefore not suitable for human settlement. However, during floods, the government helps in evacuating the communities that are affected by the floods and offer humanitarian aid and support such as food, cooking oil, legumes, buckets, plates, blankets, clothes and other essential items. The government in this case is still responsible and concerned about the safety of the people from the disasters. This case study presents a need for governments to consider other factors that either shape or reduce the vulnerability to floods in the flood prone areas. However, during elections, these areas are allocated voter registration sites and polling stations within the flood prone areas. More details on this will be presented in the next chapter as I will be discussing on the absence and presence of the government in the flood prone areas.

4.3 MOTIVATIONS TO LIVE IN FLOOD PRONE AREAS

This section focuses on factors that motivate communities to continue living in flood prone areas. The factors include community's livelihood through farming, their social networks within their original homes and their attachment to the flood prone areas. Political ecology studies suggest that emotions are tied to a particular landscape, ancestral values, culture memory and dignity, hence many people prefer living in their original homes, places of birth and where their families are rooted (Dallman et al., 2013). From work in Ghana, Addo and Danso (2017) indicate that communities that live in flood prone areas are not willing to relocate because of a variety of reasons, including low incomes and thus inability to pay rent in the new areas, not willing to lose land and social networks they have built over the years, and fear of losing their source of livelihood. My findings, as presented in this chapter, indicate that these and several other factors motivate people to live in their original homes, and thus to live with floods. Using the case study of communities living in flood prone areas, the results exemplify that these factors are variously political, socio-economic and personal in nature.

In the previous chapter, it was important to understand self-perceived vulnerability because it enabled me to understand the factors that motivate communities to live in the flood prone areas regardless of the flood risk and of the Malawian government's request that they relocate to safer areas. Currently, the government officials, including the media and other stakeholders do not understand why the communities insist on living in flood prone areas despite all the associated risks. This chapter presents that the factors and processes that motivate communities to live in the flood prone areas are complex in nature.

Floods in some cases are not perceived as a main problem in the areas due to their seasonality. communities also have local knowledge on the flood management hence are confident to face the floods during the flooding season.

Other factors are political, social, cultural and economic in nature, which are experienced personally but based in the wider community, hence indicating that relocating to safer place is not easy for all communities living in the flood prone areas. Nevertheless, there is widespread misunderstanding of motivations to live in the flood prone areas, with the wider public perceiving the reluctance to move to safer areas as strategic so that the communities benefit more from relief items and other forms of humanitarian aid.

Addo and Danso (2017) highlight that communities in Ghana prefer to live in the flood prone areas because they are not willing to lose their land, they have low income to pay rent and they do not lose their livelihood. Furthermore, Dallman et al., (2013) found that In California, people prefer to live in their original homes because of emotional ties with their ancestral values, culture, dignity and landscape. In a study of political ecology of emotions, Dallman et al., (2013) stress that even changing the physical environment within the original home is likely to destroy some cultural and sacred places where people's emotions are attached. It is clear therefore that emotions play a role in the decision to live in the flood prone areas. However, the emotions can be attached to different things, for example, sacred places, ancestral bonds, culture and tradition.

4.4 Floods Not Perceived as the Main Problem in Flood Prone Areas

The interaction between the changing environment, socio-economic, culture and livelihood amongst other factors and processes in the flood prone areas has shaped the way communities weigh the problems they experience in their daily lives. According to the household survey, 83.3% of the communities living in flood prone areas indicated that they perceived hunger as their main household problem when responding to an open ended question, asking communities what they perceive as their main problem .Apart from the areas being exposed to flooding, it is often also affected by droughts, which affect crop production. This clearly indicates that even though these communities are exposed and vulnerable to floods, the floods are not the major concern in their lives.

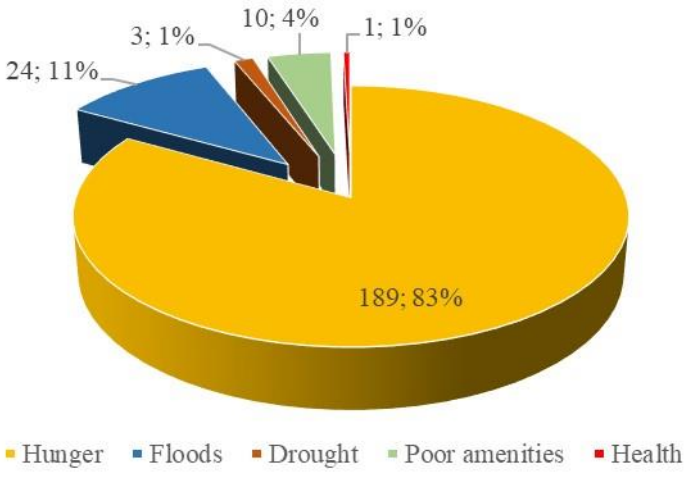

Figure 2: A Response during Household Survey on What Households Perceive as their Most Significant Problem (n = 227)

During FGDs and KIIs, communities indicated that they perceive hunger as the main problem. '*Hunger has been a major problem in our lives for over a decade, I remember those days we used to have enough food for the whole year, nowadays our harvest is not adequate to last the whole year. For most of us that live in the areas that experience floods, we are better off because we grow fruits, vegetables and even maize in the marshy areas hence making us to have enough food throughout the year and for some households, most part of the year* (KII #2, TA Mlolo, June, 2022). In another interview, another participant said that '*I would never relocate upland because I know for sure that I would not be able to have enough food for my whole family. Most of the people in the upland areas rent part of our fields, we help them to be food secure. If they come to us for help, it means our land is good for agriculture, hence we are better off here*'. (KII #12, TA Nyachikadza, March, 2022). The communities that live in flood prone areas are afraid of hunger more than the floods, therefore living in flood prone areas is an advantage for them.

Other studies also reveal that a source of livelihood is one of the reasons that communities that live in flood prone areas would not be willing to move and relocate upland (Addo and Danso, 2017). However, fewer studies have been conducted in rural areas where communities are living in flood prone area. This chapter exemplifies that in rural areas too, communities value their livelihood through farming and fishing, and through their sources of income from leasing their farmlands. This reveals an important aspect of livelihood decision-making; that is decisions are made based on what is actually lost during the floods and what is not lost. This chapter therefore illustrates that relocating the communities would not be an appropriate solution, as many communities would not be able to sustain their livelihood upland and would not have the capacity to resettle in the new areas.

A man who lost everything during the floods explained that '*for most of us, we would struggle to settle in new areas because we have lost everything It will be difficult to obtain a farm and acquire new assets in the new areas. That will require a huge sum of money that we not have. In addition, we would not be able to buy food and bags of fertilizer that will be needed in our farms. Currently, we do not apply fertilizer in our fields and we never buy maize'* (FGD# 7 TA Mlolo). This quote suggests that only communities that have other assets in the form of capital and money can afford to relocate whilst those who have nothing would suffer more if they were to relocate. This also suggest that vulnerability would increase in the new areas hence it is appropriate for communities who do not have any form of asset to remain in the flood prone areas.

These findings are similar to a study that was conducted in Thailand by Tahira and Kawasaki (2017) which suggested that regardless of the damage that the floods might pose, the poor communities have inadequate capacity to recover hence relocating them would worsen their situation. Tahira and Kawasaki (2017) argue that the poor communities would struggle to establish a new livelihood in new places that they would be requested to relocate to due to inadequate adaptive capacity. Relocating to new areas requires capital, land and other assets that would help the communities to establish themselves in the new areas. In the absence of these, these communities would suffer (Ibid). Therefore, they suggest that the focus should be on improving the early warning system, dykes and offering some form of compensation

for the lost earnings. My study states that communities are motivated to live in the flood prone areas because they are able to address food security issues which is the main perceived challenge to them. In addition, the communities clearly illustrate that they have devised ways of coping with the floods which also forms part of their motivation.

4.5 Local Knowledge and Water Level Monitoring

communities indicated that they have experienced floods for a very long time and that over time, they have devised mechanism of monitoring water levels in rivers that cause flooding in the area. communities explained that over the years, they had come up with ways of monitoring the water levels in the rivers that flood as part of an early warning system. '*Apart from the 2015 floods, the chiefs, the elderly, even some of the youth always observe the water levels in rivers that flood during the rainy season. We place some poles, other people place sticks a few metres from the river bank as a monitoring tool. When the water in the river is too much, the river will swell and usually water will reach the poles placed on the river banks. We move the poles whenever the water reaches them up to a certain point which then we pack our things and move upland temporarily. Using that system, we know when it is going to flood. And even before then, we have time to move our assets upland as we prepare for the floods. That is why we have never suffered any death during floods*' (FGD # 7, TA Mlolo,).

In a key informant interview with an old man in the village, he indicated that '*we are able to know when we are going to experience a calamity through our visit to Mbona. We have a Sacred place in TA Ngabu* [One of the areas in Nsanje, refer to case study description in chapter 2] *where we go and offer sacrifices to Mbona and consult him on several matters happening in our communities. For us older people, depending on the visit based on experience, we are able to know that we are going to experience floods. This is for old people like me. Many young ones do not take time to observe these things*' (KII #6, March, 2022). communities have designed their own ways of understanding the extreme weather events, ranging from beliefs and myths of the *Mbona* to innovative ways of flood monitoring using sticks. Based on these experiences, communities have been able to evacuate from the flood prone areas in good times, before the whole area is flooded. In addition, they have been having time to save their belongings from being swept away. However, as it has been explained in the earlier text, all the strategies were not utilised because the floods came in the middle of the night and the communities were trapped in the floods.

Local knowledge has also been used in various parts of Malawi to predict disasters such as floods and droughts. However, recently communities say that both the local knowledge and climate information from the meteorological department has not been adequate as a tool for weather forecast (Wellard et al., 2012). At the local level, there are no weather stations and some of the equipment in the weather station is outdated hence the unreliable weather forecasts (ibid). During focus group discussions, communities explained to me that '*we have lost trust with the climate information from the meteorology department, in 2010, they told us that we are going to experience floods, some people moved their belongings upland but instead, we experienced droughts. That year, our elders said we would experience drought and they were right*' (FGD #6, TA Mbenje, May, 2022). Another woman said '*I remember hearing that we are going to experience floods during the day and we experienced the floods during the night. A car from the District Commissioner went around shouting that we should move because we would be experiencing floods. As usual, none of us moved, because we could not believe them. From what happened,*

I would suggest we use both our local knowledge and even the information from the Meteorology Department. If we had moved, some of us could have been better off by now'. Shaffer (2012) indicates that a mixture of indigenous knowledge and other scientific knowledge coupled with new technology is important and useful in helping communities to adapt to climate variability in their original homes. The realities of climate change effects is that they have become more complex and in some cases, difficult to predict using the traditional means of monitoring the river flow.

The material presented in this chapter indicate that people who live in flood prone areas are motivated to live there because they monitor the floods locally and can therefore anticipate and deal with them. However, during the flooding event in 2019, their local knowledge on flood and local early warning system did not work effectively. This clearly illustrates that the early warning system needs to be integrated with modern ways of flood monitoring to enhance effective and appropriate flood preparation that would reduce loss to property and lives. There has been an effort from the Department of Climate Change and Meteorology, Department of Disaster Management Affairs and the Local Government through the District Council to disseminate climate information to those who live in flood prone areas for their safety during floods. The people are told to move upland to safer places to avoid being swept off by the floods. This had reduced vulnerability of the communities to floods in the flood prone areas since most of the times they were able to move upland before the floods occur and were able to save their belongings. During the 2019 floods however, the results indicated that flood occurrence is unpredictable and complex for the existing local, indigenous and scientific monitoring hence there is a need for a more comprehensive and sophisticated way of monitoring the floods that goes beyond recording amount of rainfall over a period. The traditional way of monitoring water levels with a stick in the flood prone area needs to be combined with reliable climate information from weather stations that have automated and more sophisticated weather monitoring equipment.

In the long term, the results show that there is need for a comprehensive and more reliable early warning system from the service providers to build trust between the climate information service providers and those that need to utilise the information. My study corroborates another study that was conducted in the Philippines which indicates that communities do not trust the early warning system because the messages are not clear and do not provide convincing information to make people move upland (Neussner, 2014). This study shows that forced evacuation is necessary where people do not follow official evacuation advice and do not follow government warning (ibid). My research however suggests that insisting that communities should evacuate is totally impractical due to the affected people's livelihood, attachment to the area and other factors that are important but are ignored in the policy; some of which are political and costly in nature as will be discussed in the next section.

4.6 Social and Cultural Factors in Living with Floods

During the household survey, almost 80% of the communities indicated that they have a good social network with people living in upland areas. '*During floods our friends and relatives that live upland accommodate us in their homes, we keep our belongings there too and wait till our home is dry and we come back.*

During droughts, we offer them some piece of land where they can grow crops' (FGD 7#, TA Mlolo, June 2022). Another participant added that '*there are some people who let out some of the houses during floods. Based on the agreements, some charge in cash or number of bags of maize. The charge is very subjective and usually depends on the type of relationship that the people have*' (KII #40, TA Mbenje, May, 2022). Another community member living in upland area indicated that '*We have a good relationship with* communities *that live in flood prone areas. During droughts many of us farm in the flood prone areas. Even in a normal year, we grow winter crops, including maize in the flood prone areas. We benefit from each other*' (KII #45 TA Mbenje, June, 2022). The social networks and the relationships between the communities living in the flood prone areas and communities living in the upland communities suggest that land in flood prone areas is an asset in itself. This illustration presents a novel contribution in framing vulnerability to floods based on self-perceived vulnerability. communities living in the flood prone areas perceive their land in flood prone areas as an asset that supports their livelihood. Adding to the discussion earlier on that floods do not occur every year, the results suggests that communities are less vulnerable to climate variability in the flood prone areas. communities are therefore better off living in the flood prone areas than in upland areas due to droughts and limited space.

In some cases, some communities that live in the flood prone areas are not happy that they are given names during floods. '*During floods, the communities that live upland mock us and give us various names that are associated with being displaced by floods even though during droughts, we do not give them names associated with droughts*' (FGD #9, TA Mlolo). Another old man who has relocated 5 times indicated that '*we are called refugees in the same country, as if we do not have our own homes. This humiliation during floods has taught us that 'one is respected in their own land' hence we shall never settle in any man's land apart from our original land'* (KII #11, TA Nyachikadza). Climate migration is another aspect of resettlement that have been discussed by various scholars as providing a degrading status for the relocated communities hence indicating how complex and dynamic the relocation process is as part of local adaptation (Addo & Danso, 2017). More details will be presented in the next chapter where I will be discussing the complexity of local adaptation and relocation. However, the public has different perception towards the communities living in the flood prone areas contrary to what was indicated by the communities.

4.7 Adaptation to floods

The results from the household survey reveal that 40% of the households mentioned that they were able to cope with the floods without external support indicating that they are able to survive on their own and recover after floods without any form of support from the government or humanitarian organisations. The other 60% of the farming households that participated in the research indicated that they cannot cope with the floods on their own without external support in terms of cash, shelter and food during the floods and about 5 months after the floods.

Communities are used to the way they live in the flood prone areas. The social, cultural, political and livelihood interactions lead to local identities and convey a history of where they come from, how their ancestors have been surviving the floods and a unique livelihood which they are proud of. They are referred to locally as 'anthu akumadzi', meaning people who come from a place that is surrounded by water. This chapter therefore examines the opportunities that exist in flood prone areas that enable the

communities and household to cope with the floods. This is important for adaptation studies and projects as it suggests that policy makers and project designers and should seek to support already existing strategies and practices. This would represent a less costly approach which would thus be particularly relevant for low-income countries.

4.7.1 The Role of Assets in Adapting to Floods

The farming households indicated that they have various assets that are useful in various ways during floods. The findings show that the valuable assets for the farming households in the flood prone areas are farmland, livestock, operational radio, operational mobile phone and a functional bicycle (Figure 7). A valuable asset, according to the research participants is an asset that communities identified as very important to their livelihood in the flood prone areas. The household survey revealed that over 40% of the farming households who are able to cope with the floods own a combination of assets, including farmland, livestock, operational radios, operational mobile phones and functional bicycle. These same households are able to cope without external support, therefore suggesting that in the flood prone areas, land, livestock, bicycles, radios and mobile phones are critical assets that support communities to be able to cope with the floods without seeking support from other people or institutions. Each asset will be discussed below in relation to the role it plays in facilitating adaptation in the flood prone areas.

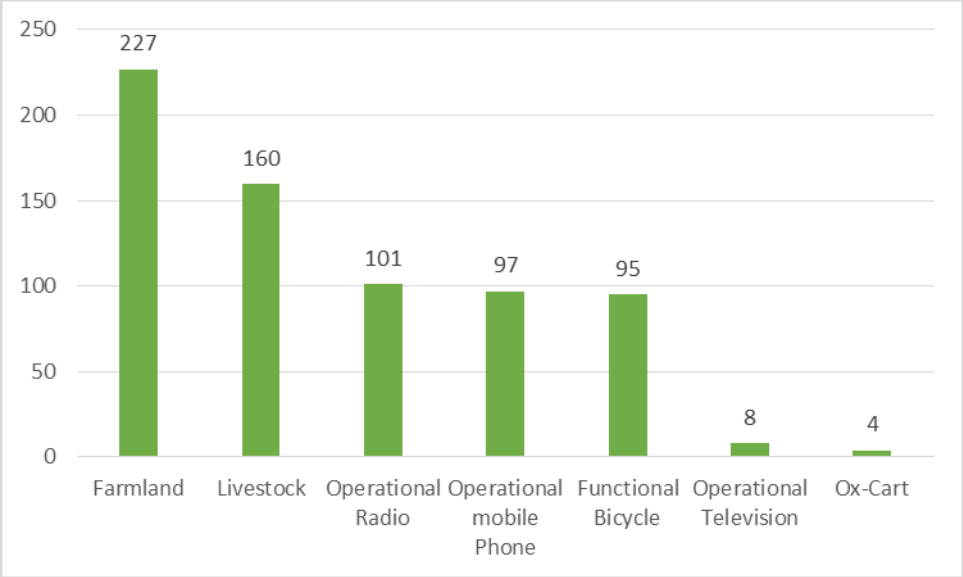

Figure 3: Assets Owned by Farming Households Participating in the Household Survey

4.7.2 The Role of Farmland in Adapting to Floods

Farmland is one of the critical assets owned by those living in the flood prone areas. A middle-class participant in TA Nyachikadza explained that '*We depend on the land that was passed on to us from our ancestors, some of us have 4 acres. Many people have bigger pieces of land that is even not cultivated because of inadequate capacity to do so*' (KII #11). In another interview, a very innovative participant in TA Mlolo articulated that '*We have huge pieces of land that even the government can utilise for agriculture to make the nation food secure. We feed Malawi, there are several trucks that collect maize*

during high peak of sales. Imagine if we were to grow maize on all the farmland that is available, Malawi would be food secure' (KII #36). Another smallholder farmer living in a village next to villages that flood claimed that 'communities *living in the areas that flood is better off because they have huge farmlands which they grow crops and even some land is left idle. That case is very rare uplands because of population pressure, the land is not adequate for us and unfertile too resulting in low yields. That is why we go to rent farmland in the flood prone areas so that we should be food secure*' (KII #43, TA Mbenje).

Another participant relayed that '*Farmland is also a source of income for most of us,* communities *living upland, rent the farms from us during droughts and even during the normal rainy season. That way we are able to have money to buy soap, paying school fees, buy clothes, sugar, relish for example beef and eggs. Without the land we have as an asset, most of us would have been in trouble, no food, no extra cash*' (KII #8, TA Ndamera). Whilst much emphasis is put on the economic losses of agricultural land and products in relation to levels of vulnerability and coping strategies in the flood prone areas of Anambra State in Nigeria (Enete et al., 2016), my study indicates that there is also an economic *gain* in the flood prone areas as well as economic losses.

The land that is accessed and passed on from community's ancestors has created a form of security that enables them to sustain their livelihoods in times of droughts and minimal flooding. Participant explained that '*After the floods, we grow maize and sweet potatoes and they grow very well, as a result, we usually harvest enough to feed ourselves. We might lose our crops during the floods, but we are able to grow crops again using the moisture after the floods, that way, we do not suffer too much. We grow enough to even sell to communities that live in areas that do not flood, they still depend on us*' (FGD #4, TA Mbenje). This suggest that these communities remain food secure after growing and harvesting their crops, even some are able to have surplus for sale, which enables them to have money to meet their daily needs as per the quotes in the key informant interviews. In some ways, floods enhance the communities' livelihood in the flood prone areas.

It is crucial to understand the role of farmland in the flood prone areas. It reveals how the government and other development partners can learn from the existing strategies to develop strategies that ensure that the farmland in the flood prone areas is protected and that as part of recovery from floods, agricultural inputs should be included as part of the recovery support. communities clearly indicate that they are trying on their own to support themselves to cope with the floods. They also expressed that they would like the government to support the existing strategies to promote sustainable livelihoods rather than neglecting the relevance of their livelihood. communities living in the flood prone areas have been perceived as stubborn victims seeking sympathy from their governments and humanitarian organisations (Nyasatimes, January, 2015)..

4.7.2.1 Crop Production

The communities indicated that they grow various crops depending on the place and type of season. These farmers indicated that their main reliable crops are maize, rice and cotton. '*We usually grow rice in the flood plains because it is usually wet with more moisture which is not suitable for other crops such as maize. We also have vegetable gardens near river banks (in dambo areas) where we grow different types of leafy vegetables, tomatoes, onions, cucumbers, carrots, and sugarcanes amongst other crops*' (FGD

#4, TA Mbenje). Another participant shared that '…*the soils we have here are also good for various fruits including mangoes, pawpaw, pears and bananas amongst the popular ones*' (FGD # 2, TA Ndamera). According to the household survey, maize is one of the main staple food and is grown by approximately 95% of the farming households. Maize is grown twice in the year, during the normal rainy season and during winter through irrigation. During droughts, maize is still grown through irrigation. In addition, these farmers have been introduced to new farming methods that reserve moisture known as conservation farming in order to enhance crop production in the face of droughts and floods. This type of farming is being led by the Government through the Ministry of Agriculture and Food Security. Conservation Agriculture (CA), is the type of farming that is encouraged in areas that have been highly affected by environmental degradation and soil erosion and other types of farming that have resulted in loss of soil nutrients and soil cover (African Conservation Tillage Network, 2008).

Conservation Agriculture (CA) aims to enhance agricultural production in areas that experience droughts and dry spells. Interventions, such as CA and Climate Smart

Agriculture programmes are implemented across the whole of Malawi by the Ministry of Agriculture Government of Malawi (2012), without meeting specific and localised agricultural demands in some of the areas. In Nsanje district, about 80% of the targeted farming households revealed that agricultural production had reduced since the change of the old agricultural practices to CA whilst the other 20% of the farmers presented that they had noted an increase in the agricultural production. In addition, during FGD 1 in TA Ndamera, chiefs and some Civil Protection Committee Members indicated that CA is not suitable in the flood prone areas due to the nature of the soils and existing soil moisture levels. The findings on CA clearly indicate that national programs need to be tested at regional, local and even at a smaller scale, in this case, village level, in order to identify implementation challenges that need specific attention. The major highlight in this example is that such programs are not tested in the areas where it needs to be implemented before the actual implementation starts in order to check suitability and practicality of the intervention.

There have been several criticisms of this type of farming as to whether indeed it increase the yields for farmers and reduces the workload for famers during weeding as it is claimed (Giller et al., 2009). In the Nsanje case, 40% of communities in the household survey suggested that conducting soil sample analysis would be appropriate to determine the type of soil that has accumulated over time through the flash floods to guide extension workers and farmers on the type of crops that would be suitable to be grown, which farming methods would be appropriate and the conditions that would be favourable to enhance crop productivity.

A group village chief indicated that '*During the January 2019 floods, our farmlands have been affected badly. The soils have changed and the maize is no longer growing. We even tried potatoes, but they still have not grown, we do not know what to do now. The government and other organisations should do research and then advise us on what we should grow. We have been affected so much and we have run out of ideas*' (KII #48, TA Mlolo). The current change of soil structure in some flood prone areas in TA Mlolo suggests that there is need for more agricultural research to identify suitable farming methods and appropriate crops to be grown. This also implies that the floods and unstable climate pattern will require more robust agricultural research to enhance agricultural productivity. Currently, in these flood prone

areas, the change in soil structure due to floods in some areas and ineffectiveness of CA in other areas will exacerbate vulnerability of these smallholder farmers to floods and other effects of climate variability.

In addition, my results indicate that the farmers who practice CA adopted it because they were advised by the agriculture extension workers to do so and that it was recommended by the government due to loss of soil nutrients and soil erosion. This is in line with Wall (2007) who suggests that successful adoption of CA depends on how well the farmers are aware of it and the problem they are facing in terms of low agricultural production. In this study, the farmers also indicated that they changed their ways of farming because they were having less yields and due to climate variability, they were experiencing droughts and lost most of their crops. However, for some farmers that have not experienced the benefits of CA, they indicated that they are hopeless because either way, there is a reduction in the crop yield and they said that they are waiting upon the government, through the Ministry of Agriculture to facilitate further research and come up with appropriate farming recommendations. Other farmers indicated that they are conducting various farming techniques on a trial and error basis and hope that one day they will discover for themselves what will work for them. This in a way indicates that some communities are being innovative by trying what they think can work for their agricultural land even though it is a long and frustrating process. As the climate is changing, with projected increase in rainfall intensity and drought events, it is becoming clear that new farming methods and types of suitable crops will be needed (NAPA, 2006). This therefore suggests the need for new studies on soil structures and textures in flooding sites to be able to provide adequate technical support to the communities. This also offers an opportunity for joint experimentation of agricultural research institutes and communities whereby new approaches to farming would be identified to enhance food security in the face of climate change.

These farmers, through extension workers have been introduced to irrigation farming, drought tolerant crops and other transferable skills relating to agriculture. During floods, after their crops are swept away, they usually grow sweet potatoes. During drought and dry spells, they grow drought tolerant crops, mainly millet and sorghum. In terms of farming, agriculture extension workers play a major role in the type of farming these farmers are involved in. According to the farmers, the extension workers are government representatives hence are respected. However, it was observed that some communities followed what the extension workers taught them despite not understanding why they had to change the type of farming. Around 75% of the respondents when asked why it was important to follow new methods of farming, indicated that they had to follow what authorities say. This has various implications on the sustainability of the activities. The lack of ownership of interventions in communities' results in abandoning of the strategies when the projects end and there is no one leading the interventions.

Some factors that have been attributed to as enhancing adaptation and development projects in Sub Saharan Africa are ownership, shared responsibility, transparency and community involvement therefore in cases when these factors are lacking, sustainability of project interventions is expected to be low (Ikejemba et al., 2017). CA interventions in Malawi are supported by international organisations such as the Food and Agriculture Organisation (FAO) through the Ministry of Agriculture. The findings that about 75% of the smallholder farmers implement CA activities because they are told to do so by agriculture extension workers suggests that if FAO changes focus and reduces support on CA, and if the

Ministry changes its focus on another type of farming or intervention, it is very likely that CA will no longer be practiced by some farmers. This then reveals that there is inadequate and inappropriate training to the farmers to make them understand why they are doing what they do when introducing the interventions to ensure sustainability of the seemingly best agricultural practices. The results also illustrate that the farmers are not motivated to own the interventions and sustain them without the help of agriculture extension workers. There is lack of proper technical communication between the communities and agriculture extension workers which presents a lack of understanding on the new farming methods and technologies in farmers at the beginning of the interventions to ensure ownership and sustainability of beneficial interventions after the funding period is over. This raises concern on how sustainable some adaptation strategies are and how they will reduce vulnerability to climate variability in the long term. In areas where more people are poor, the adoption of CA and obviously some new technologies will be different and in other cases slower than anticipated (Cavanagh et al., 2017).

In the flood prone areas, the findings illustrate that CA is not beneficial to all the smallholder farmers even though it is highly encouraged by the Ministry of Agriculture. The changes in the soil structure due to the fatal flash floods reveal that whilst other areas are benefiting from the fertile soils, communities in GVH Kadyampa in TA Mlolo have been negatively affected by the same flash floods. It is therefore evident that vulnerability contexts are different, unequally distributed and shaped by the way several physical and social factors interact, therefore adaptation strategies ought to incorporate the vulnerability context and address the specific challenges. In this case, the soil needs to be tested to identify the new type of soil that has been created due to the flash floods and therefore present the type of crops that can be suitable based on the soil characteristics and the physical environment.

4.7.2.2 Post-harvest Handling

In relation to post-harvest handling, all the research participants indicated that they currently store their maize in sacks designated for storing maize. These sacks are the regular bags for maize that are not treated and none of the research participants were aware of any new forms of storing maize. During conferences, I interacted with another Doctoral student working in a nearby community, who indicated that the Agriculture Research Institute in Malawi is planning to introduce the new forms of storing technologies to the smallholder farmers, such as treated empty sacks of maize and metal silos. These new storage technologies that will be introduced will be an entirely new concept for the farmers which as shown in my study has the potential of taking a long time to be accepted and established. In addition to that, some of the farmers do not produce enough for long term storage. This suggests that whilst communities are still struggling with how best they can produce more in some cases, the government is focusing on how to store the produce. According to the household survey, about 98% of the communities indicated that they do not suffer produce losses after harvesting, although this is possible during flooding and outbreaks of pests. However, it is important to note that I am not suggesting that the new storage technologies are not relevant in the areas, but rather that adaptation priorities need to be identified and understood. The discrepancies in the need and intervention by various programs indicate that there is inadequate dialogue between the communities that are affected by the floods and the service providers and donors.

Older research participants indicated that they used to store their maize in Chikwa, which was a traditional form of silo. The Chikwa was handled with some cultural beliefs: only women and younger children were

allowed to take maize from the silos because they were regarded as clean and not mischievous. Men and older children were not allowed because it was believed that if someone was mischievous in conduct, the produce would decrease. During that time, the maize would never go bad the whole time it was stored. Over the years, these traditional beliefs have been lost to new concepts of storage and all farmers have been advised to change. According to the agricultural extension workers, there was fear that the maize would be getting damaged by weevils and other pests hence the introduction of the new sack bags, whilst for some farmers, they indicated that the Chikwas used to be too big hence it was not necessary to use them with the amount of produce they harvested.

Whilst agricultural extension workers indicate that they discouraged use of Chikwas because of weevils that attack the stored produce, over 90% of the farmers did not relate the change of storage due to that. This indicates that communication is a challenge between the extension workers and the smallholder farmers where the extension workers struggle to effectively pass on the technical and scientific explanation to the communities hence some communities do not know or understand why some changes are necessary. Even for a change in new farming technologies, most of the communities indicated that they heard from agricultural extension workers that they needed to change and they complied without understanding the reason behind it. The communication gap in this case could contribute to the slow adoption rate of adaptation strategies that might reduce vulnerability of the communities by enhancing their livelihood.

During an in-depth interview with an extension worker, he indicated that it is true that sometimes they do not fully explain these scientific and technical issues to communities because they have huge pressure on their work and time is limited. In addition, he indicated that for some communities, they are not interested to know so due to a lack of adequate extension workers in the areas, they do not explain these things. This could be one of the reasons contributing to the death of projects after the development partners leave the area because there is no adequate ownership and understanding of the concepts within the local community. Apart from the farmland, crop production and post-harvest handling issues, I also examined the role of radios, mobile phones and bicycles as valuable assets that complement the livelihood of the communities in the flood prone areas.

4.7.2.2 The Role of Livestock in Adapting to Floods

Livestock also play an important role in the flood prone areas. Livestock is used as a source of prestige, exchange for shelter in the upland areas during flooding, and a source of income during seasons of crisis. '*In our community, owing livestock is a sign that someone is rich. Even though someone might not have cash readily available, the cash is tied to the livestock so we say those people are rich*' (Community meeting during wealth ranking exercise, January, 2015). '*Those who have a variety of livestock such as cattle, goats, sheep, pigs, guinea fowl, ducks, chickens and doves are considered very rich. The others who only have chickens, guinea fowl, ducks and small livestock might not be considered very rich, but are considered to be better off. Those who have no livestock at all are considered poor in this community'*. (KII #1, Nsanje District Council). An indication of wealth is subjective to the communities and district. During one of the wealth ranking studies I conducted in Chiradzulu in 2008 when I was working as a consultant, communities indicated that owing small livestock such as chickens, guinea fowls and doves was not a sign of being rich; being rich was associated with bigger livestock such as cattle, goats, pigs

and sheep. In this community, the people who had chickens, guinea fowls and doves were considered to be poor because they were mostly beneficiaries of a livelihood project that target the ultra-poor. It is important to note that for the purpose of the livelihood of the communities living in the flood prone areas, the distinction between being rich, better off and poor is very important as it determines the adaptation strategies and survival during flooding.

During the January, 2015 floods, poor smallholder farmers and those who had lost everything, including money lamented that those who had money, livestock or produce were rescued first by private boat owners who demanded payment instantaneously, leaving behind those who did not have any form of payment that was demanded by the boat owners. communities in Traditional Authority Mlolo indicated that '*During the floods, some people with private boats come to our rescue. They usually come with two boats, one to collect people and the other to collect a form of payment usually, bags of maize, rice and livestock, including chickens and goats. Those who do not have livestock or agricultural products are left behind*' (FGD #11, TA Mlolo June, 2022). A relatively rich smallholder farmer explained that '*I gave the boat owners 2 goats and 3 chickens as a form of payment for me and my 5 children, the payment is subjective and it depends on how one negotiates the payment, it is subjective*' (FGD #10, TA Mlolo, June, 2022.

Another participant who belonged in the group that was perceived to be worse off in terms of economic status and therefore more vulnerable to floods lamented that '*During the January, 2019 floods, some of us who did not have money were left behind, I regretted to have been so poor. The boat owners refused to be merciful to me and just take me without any form of payment. They requested payment and said repeatedly that they were focussing only on those who had any form of payment. We ended up climbing the trees because there was no hope for us but we could not give up* (KII #36 TA Mlolo, May, 2022). Another participant in the same group further lamented that that '*We had to climb trees until the government intervened. We were rescued by helicopters because everything was swept off, including our houses and everything was under water*' (KII #40, TA Mlolo, May, 2022. The poor suffer more in the flood prone areas due to inadequate agricultural products and livestock that they could use to cope with the floods. Survival in the flood prone areas without government intervention thus depends on the type of assets a household has.

The poorest of the poor, the elderly, orphans and those that could not afford to pay had to wait for the government arranged boats and helicopter, these are mostly the group that also survived the floods in trees whilst waiting to be evacuated by the government. During focus group discussions, the communities indicated that the communities lost their boats and did not know where the men with private boats came from. They emphasised that if they were from neighbouring villages, most of them would have negotiated to make the payments after the floods hence they could have been rescued without upfront payment. Communities who are perceived to be better off have two homes, one in the flood prone areas and another in the upland areas. Their livestock and produce is kept in both places unlike those that cannot afford to have another home in the upland area. During floods, those that have one home in the flood prone areas lose everything whilst those that have two homes have part of the livestock and produce in the upland areas hence, they sell part of that to recover after the floods. As indicated earlier on, the social networks are strengthened due to interdependency within the smallholder farmers. In the event where the

communities in flood prone areas are destitute, the communities in upland areas do not keep them for free hence they have to live in evacuation camps until their land is dry.

Communities offer livestock as payment for temporary shelter in the upland areas during the floods. '*During the floods, we either sell our livestock to get money that we use to pay for our rent in the upland areas or we give the tenants the livestock as a form of payment, it depends on the agreement*' (FGD #7, TA Mlolo, April, 2022). '*Sometimes, the form of payment for rent in the areas that do not flood is both agricultural products such as bags of maize or rice and the livestock*'. (FGD #1, TA Ndamera, February, 2022). Another participant indicated that '*the payment is subjective, for example in a month, one can pay 2 bags of maize and 2 chickens if the landlord wants the maize and the chickens. Sometimes, one can pay K20, 000.00 (approximately £20) it depends on the agreements and how close you are with the one offering the place*' (KII #18, TA Mbenje, March, 2022). The results suggest that those who have livestock are more likely to survive without external support during the floods, since they can afford to negotiate the payment for temporary shelter, in this case, clearly suggesting that those with neither livestock nor surplus agricultural products cannot cope without external support. This further suggests that in times when the floods are unexpected and situations where the early warning system is ineffective, all the communities would not cope with the floods without external support since they would lose all their agricultural products and livestock.

This clearly illustrates that the adaptation strategies that are implemented in flood prone areas such as irrigation farming and CA would only help communities to be food secure but do not adequately empower the communities to acquire assets that would enhance their adaptive capacity to cope with the floods, during and after the floods. Supporting the poor in the flood prone areas is not based on their needs hence does not meet the different demands of the poor in the various locations. A livelihood vulnerability study in Bangladesh indicates that the poor are more vulnerable to floods and depend on social networks and local authorities because they do have any asset that would enable them to cope with the floods (Toufique & Islam, 2014). There is need for the state to invest in various sectors including health, water and infrastructure in the flood prone areas (Ibid).

There is no timely rescue plan at district (local) level to make certain that those who are poor and the vulnerable groups are pre-identified to facilitate the evacuation process. Timely evacuation from the flood prone areas during floods to established evacuation camps or to other relations and social networks is important to reduce vulnerability to floods that can be fatal if evacuation is delayed. It is clear that regardless of the efforts to stop the smallholder farmers from living in the flood prone areas by the government not providing all the necessary amenities in the areas, including boreholes and schools, these areas are still habitable and will continue to be habitable. It is clear that communities that are relatively poor will need adequate support from the government and other development partners to be able to cope with the floods and evacuate before the floods threated lives. In the next section, I will discuss the role of social networks in the flood prone areas as communities cope with the floods.

4.8. The Role of Institutions and Organisations in Adapting to Floods

According to Hodgson (2006), institutions are defined as systems of established and embedded social rules that structure social interactions. Institutions are there to support local adaptation at both the

household, community, and district level hence enhancing local adaption to floods and droughts. In addition, churches, schools, households, communities, government department, civil society organisations, nongovernmental organisations have also supported the communities and households to cope with the floods.

4.8.1 Household and Community Dynamics, and Adapting to Floods

Only 10 out of the 227 households indicated that the responsibility to provide for the home lies between both the male head and the spouse. In this case, they both participate in income generating activities and sometimes they share responsibilities where the woman's responsibilities are less than the man's responsibilities. '*The men usually make more money than the women so they are responsible to address more needs in the home whilst for women, it is usually supplementing what the men provide in the home*' (FGD # 8, TA Mlolo). In this case also, it can be implied that men are still held responsible for the management of the home, where the man is alive and responsible and women only supplement what the men provide and when the men are not there. The household head is expected to meet the household need by virtue of their role as the head. Figure 8 shows who the responsibility for decision making for everything falls at household level amongst participants in the study, revealing that this mostly falls on men. The participants indicated that even in climate related decisions, men make the decision and women do not participate in the adaptation decisions in the home. This situation is another example of exclusion at household level where women do not take part in decision making even though they are also affected with the decisions that are made.

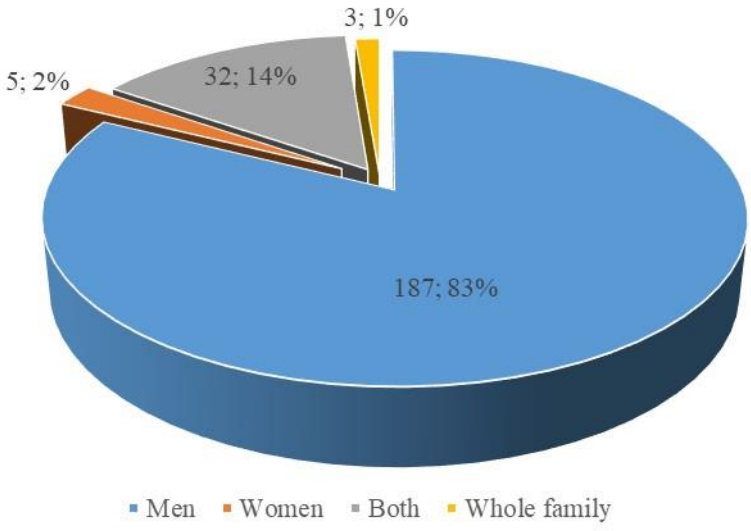

Figure 4 shows who the responsibility for all decision-making falls to at household level amongst participants in the study (n = 277)

During in-depth interviews with communities who had leadership positions and during focus group discussions, all the communities living in flood prone areas indicated that they consider floods as the main problem even though hunger is also amongst the challenges they experience (and was reported as the most important problem at the household level through the household survey). The contradiction in

response could be explained by difference in community and household priorities. The results reveal that households focus more on individual and personal problems whilst in a group, the farmers will mention problems which affect them as a group, at the community level. It was also apparent that during in-depth interviews with some chiefs and members of the village committees, floods and droughts were mentioned as major problems affecting the communities, as community heads in this case. This indicates that chiefs and community leaders consider community problems more and are concerned with them personally unlike communities at household level whose concern is mainly on their household's welfare and livelihood.

These findings illustrate that household members could be interested to participate in activities be it adaptation strategies or development activities that firstly addresses their household needs, otherwise they will always focus on how to deal with their personal, household problems first. This is an issue that demands attention when designing adaptation programs because reducing household vulnerability to floods and droughts require more collective strategies than individualism (Siegel and Alwang, 1999). Siegel and Alwang (1999) also indicate that for poor rural households, the ways of coping with either droughts or floods are usually not economically sustainable; they are short term thereby increasing household vulnerability to the climate variability they are trying to cope with. The farmers during my interviews indicated that when they are pressed with a need, they first of all consider doing piece work as a source of income, which will help them to address the current household need. If that fails, then they resolve into selling household assets such as livestock, bicycles, radios, phones and other agricultural products including the maize they store to take them to the next harvesting season. Now this in itself is not sustainable and can cause problems because like in the case of the farmers I interviewed, the price of the bags of maize they sell and whatever asset they sell when they are desperate for money is usually less than the amount, they will need to replace it. This in itself exacerbates their poverty and vulnerability during drought and floods.

This strategy of selling assets for payment of services leaves the communities worse off because they never invest in other assets but instead, they spend the proceeds on consumables and perishables. This clearly illustrates that there is not any adaptation intervention that empowers the poorest of the poor economically to enable them to address their day-to-day problems; whilst also empowering them to be able to help themselves when disaster strikes. In addition, this suggests that because these poorest of the poor communities isolate themselves, they are likely to continue being more vulnerable when a disaster strikes. There are no deliberate efforts designed to encourage such communities to take part in community activities and also belong to certain social networks that would enable them to learn other transferable skills and empower themselves. The findings suggest that a deliberate social group at village level that would support the vulnerable groups at all times can be explored as a necessary aspect within the local adaptation strategy.

4.9 **The Role of Chiefs in Adaptation to Floods**

Community leaders and chiefs are approached when there is a community crisis or need unlike with a crisis at the household level where the head of that particular household is turned to. Out of the 227 households survey, 68% indicated that it is the village headmen who are approached when there is a disaster in the community, including floods and droughts (Figure 9).

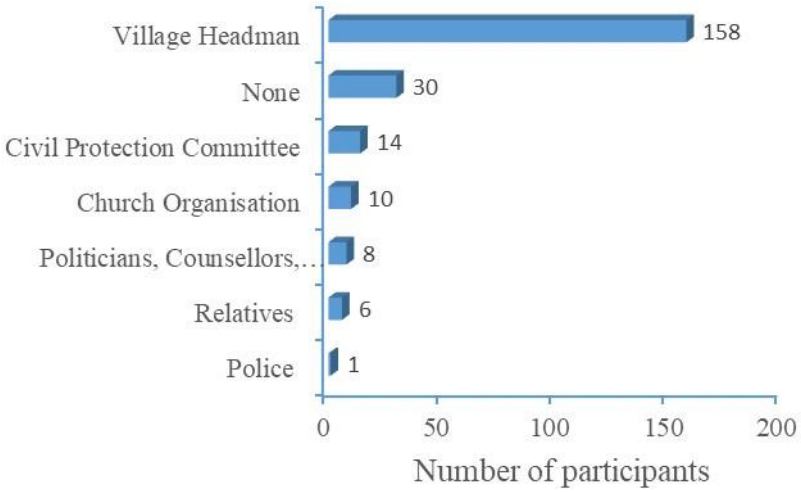

Figure 5 Shows Responses during a Household Survey on who is Contacted

First when Disaster Strikes at Community Level (n = 277)

According to fieldwork discussions, the majority of the communities indicated that community leaders provide security and communities' short and long term solutions during a crisis, including a disaster such as flooding. The participant who indicated that they consulted no one during a crisis further indicated that '*we feel left out in the community, we are not regarded as part of the community when it comes to making decisions, our voices would not be heard at all. However during floods, we are rescued together with other affected people and during social cash transfers that are meant for the poor, we are also considered sometimes. Our chief is still responsible for us.*' (FGD #5, TA Mbenje). This group according to the communities themselves included the most vulnerable households, the poorest of the poor, the aged and farmers who do not usually have social networks within and outside their living environment. This also verifies that there are various social groups within the affected communities that are left out in community activities because of their socioeconomic status and social group identification. However, 10 out of the 30 households that indicated not to consult anyone when a disaster strike indicated that they do so as a result of personal preference. Twenty households indicated that they feel that they are not welcome in other social groups, that they are stigmatised and hence withdraw themselves from such social groups. Apart from chiefs, there are church leaders, teachers and the police play a significant role during flooding.

4.10 BARRIERS AND LIMITATIONS TO LOCAL ADAPTATION

It is clear that gender and culture play a very important role in the lives of the smallholder farmers living in the flood prone areas. In this chapter, I will discuss how misconception of power dynamics and gender issues at both household and community level by policy makers, governments, the affected communities themselves and various institutions that support adaptation to climate variability exacerbates vulnerability and limits adaptation in the flood prone areas. In addition, this chapter illustrates that there are also some factors beyond the factors that are mentioned in the local adaptation frameworks, (Africa Climate Change Resilience Alliance (ACCRA), 2010; Engle, 2011; Gupta et al., 2010) that need to be adopted in order to

comprehensively assess the adaptive capacity of households, communities and institutions. The factors that are highlighted in this chapter illustrate the factors that affect local adaptation in Nsanje and in Malawi therefore can be similar to other areas that have similar characteristics. However, this thesis is clear that vulnerability is differentiated, with some groups of people being more vulnerable than others. The adaptation strategies therefore should be different to suit and address the different levels of vulnerability and groups of people (Pelling et al., 2015).

Finally, this thesis illustrates that some of the challenges to local adaptation are dynamic and more complicated hence present themselves beyond the categorised barriers and limits. Their manifestation therefore require more transformation in the way adaptation issues are strategised in order to effectively reduce vulnerability to climate variability.

4.10.1 Gender imbalance

Gender plays a hugely important role in creating vulnerability and has an opportunity to enhancing adaptive capacity amongst those living in flood prone areas. In terms of gender roles, the men are the head of the family and hence the decision maker in most households. Women are not given a chance to share their views. During focus group discussions, one woman indicated that '*even if there are rare cases when the men would listen to the women's view, their views are never considered and the men still do what they have decided*' (FGD #11, TA Kunthembwe). According to the discussions and in-depth interviews, it was revealed that it is the men that make overall decisions in the home for various reasons.

During a focus group discussion with male chiefs and community leaders, the men explained that '*we are men and household heads so we are supposed to make all the important decisions in the home, in actual fact, we are supposed to make all the decisions in the household*' (FGD #1, TA Ndamera). Men are considered to be the head of the household therefore they feel they are supposed to make decisions in the home. The attitude of being a man and hence needing to make decisions in the home has contradictory consequences. In the positive, it gives the men the responsibility to make certain that the households are surviving in terms of availability of food and other household necessities. For any man to be considered responsible, these aspects could then mean that whilst the women are focusing on managing the home and farming, the men would focus on providing for the home and farming. However, the majority of women in the farming household and during focus group discussion indicated that this concept of men making decision in the household has led to women being passive. '*We are regarded as voiceless, powerless and not knowledgeable. In our homes, we cannot participate in any decision making. If we speak up, we are considered rude and stubborn, hence we just have to agree to everything that a man says*' (FGD #7, TA Mlolo). In addition, one male farmer said '*a woman is always a woman, a man who bows down to what a woman says is considered to be a coward in our society. Where would they get the knowledge from? They know nothing!*' (FGD # 6, TA Mbenje). Most of the men during the men focus group discussions also indicated the same which then implies that women are powerless and voiceless.

During the focus group discussions with both men and women, women were respectful of the men and even chose not to argue with them accordingly when they were raising issues that were oppressive. The women only felt able to make unpleasant facial expressions and only made comments about it after I assured them that the issues that we were discussing were meant for studies and I would not expose them

to community leaders and other people in their community. This idea reflects women are oppressed in their environments. There are many cases of injustice and unfair decisions that are made to the disadvantage of women and yet the women themselves are voiceless. This is one of the issues that is critical to enhance participatory decision-making at household level that would then lead to households being resilient to their own problems. In this case, strategic women's groups that would support and empower women and empowering women through education can partly inspire women to take part in meaningful discussions at household level. However, there are also challenges with this approach as will be discussed in the next section which suggests that transformation is required in order to reduce vulnerability to floods at all levels.

4.10.2. Household Power and Capacity to Cope

During a focus group discussion with women only, women articulated that '*If only these men were very supportive, we could have gone so far in terms of adaptation. It is difficult to effectively adapt to the floods and climate variability because the men pull us down at household level which also exacerbates household poverty. That is why we are failing to develop*' (FGD #2, TA Ndamera). Another woman indicated that '*many of us here are not happily married, our husbands have other girlfriends and they spend most of their time and money there. As women, we struggle on our own to provide for the home, food for us and the kids. We do small businesses and when we are coping and making profits, these men come and take the money from us. They say they have better plans with the money only to go and drink and go to other women and that's how we live'* (KII #24, TA Mbenje). Another woman said that '*men are very powerful here, sometimes, if you don't comply, they actually beat you up so to avoid being beaten, we surrender the money and we struggle again*' (FGD #8, TA Mlolo). It is evident hereby that issues of gender and power dynamics at household level offer an opportunity of abuse for those that are weaker in the society.

Abuse of power at household level and women not being given an opportunity to participate in household decision making reveals that unless adaptation strategies are deliberately inclusive of these specific gender issues, women will not benefit from adaptation interventions. Inclusive adaptation and deliberate strategies that incorporate women and encourage participation of women at both household and community level would eventually encourage women to actively take part in adaptation strategies that would eventually enhance household resilience to floods and other effects of climate variability. Dealing with attitude and breaking abusive and non-constructive cultural norms is necessary in flood prone areas to enhance the effective design of adaptation programmes. As Codjoe and Issah (2016) allude to in a culture and adaptation study in communities in Ghana, local cultural context is very important in the design of effective adaptation options. The authors found out that adoption and participation in adaptation strategies was mainly due to cultural norms in different communities hence suggesting that culture is a component that should be incorporated in the design and implementation of local adaption strategies.

There are also cases where women themselves have low self-esteem, which also puts them at risk of being abused. '*We all need a man at some point and we are respected when at least people know we are married regardless of what the man does*' (FGD #3 TA Ndamera). Many women agreed to this point and it has a reflection on how women feel they are so vulnerable and can never do anything on their own to make their lives better. This aspect of gender and power dynamics at household level has a negative impact on

household adaptation hence exacerbates vulnerability of the household level. In addition, it is the women that are more stressed and under pressure because they work so hard to make ends meet whilst some men take advantage of them.

The findings reveal that adaptation strategies are not comprehensive in addressing these issues that negatively affect adaptation at the household level. In addition, this suggests that women cannot be protected and empowered when they are living with abusive men. They fail to negotiate with their men to come up with collective solutions that will enhance resilience to floods and droughts in the household. Adaptation strategies do not address all aspects of household power dynamics therefore most women do not take part in climate related and livelihood decision at the household level. Climate related decisions at the household level are not done in a respectful and mutual understanding manner therefore fail to collectively address climate related challenges. Every individual in a household needs to be able to understand how they can reduce their vulnerability to floods and enhance local adaptation at household level to be resilient to climate variability, failure to which household vulnerability to floods and poverty levels will be exacerbated. My understanding in these findings is that if women are given much support, adaptation initiatives would be fruitful as they are practically home managers and responsible for household needs and events even though commonly, men are considered to be the head hence heading everything in the household. Women need to be supported and empowered to be able to negotiate with men to overcome obstructive traditions.

CHAPTER FIVE

SUUMARY, CONCLUSION RECOMMENDATION

5.0 Introduction

This final chapter summarizes the overall findings and contributions of the thesis, focusing on how the research questions have been answered in relation to self-perceived vulnerability to floods and local adaptation. The chapter presents significant findings on how complex vulnerability and adaptation issues are, including how they are generated and exacerbated in the contexts of the everyday lives of smallholder farmers living in the flood prone areas. In addition, the chapter highlights the disadvantages of permanent relocation process as a means of reducing vulnerability to floods in the flood prone areas versus the benefits of temporary migration as a commonly practised adaptation in the flood prone areas. The chapter then presents some of the implications for local, national and global adaptation to climate change plans and strategies, and suggests that the generic adaptation strategies are exacerbating vulnerability to climate variability. There is a need to contextualise vulnerability, understand how it is created, how the affected people perceive the vulnerability and how they are adapting to the environmental changes in order to meaningfully contribute towards reducing their vulnerability by enhancing their adaptive capacity in situ.

5.1 Discussion of the Findings

Environmental migration has been framed differently by various institutions based on their agendas. Ransan-Cooper et al., (2015) highlight the different terms and situations that define environmental migrants as adaptive agents, security threats, victims and political subjects. Furthermore, they highlight

that the different frames have an implication of the how the policies that are formulated and thereby revealing power relations in the way adaptation projects are designed. The review of these various frames indicates how external actors and institutions perceive environmental migrants from particular viewpoints, whilst limited information and studies have been conducted to understand how the environmental migrants *themselves* perceive their vulnerability. It is evident that some groups of people in various regions of the world are more vulnerable to climate variability than other (Adger et al., 2003). Developing countries suffer the effects of climate change more than the developed countries because they do not have the financial and technical capacity to cope with the floods (UNFCCC, 2013). My research illustrates the contexts that shape and define the vulnerability to floods and climate variability in the flood prone areas and contributes to other scholarship on how the social, economic, political, cultural and natural factors interplay in various contexts to either exacerbate or reduce the vulnerability (e.g. Harrison and Chiroro, 2016; Tucker et al., 2015). Bryan et al., (2009) indicate that smallholder farmers will be vulnerable to climate variability more because they rely on agricultural products which will be directly affected by the extreme weather events. In another perspective, Dilling et al., (2015) reveal that vulnerability is dynamic and complex with various factors interplaying at the local level to shape and define vulnerability. The need therefore to understand the underlying causes of vulnerability and local adaptation in context is relevant to inform climate change policies and shape the design of climate change adaptation programs that seek to reduce vulnerability and enhance adaptive capacity of those that are heavily affected (Ribot, 2014). My research demonstrates that there is a discrepancy in the understanding of vulnerability to floods and local adaptation between the communities who experience the floods and the Government of Malawi, through the Department of Disaster Management Affairs.

Firstly, this research contributes towards framing vulnerability based on the perception of the different groups of people that are vulnerable to climate variability and have experienced environmental changes throughout their everyday lives. The communities living in the flood prone areas perceive floods as part of their livelihood. The communities have experienced floods for over 5 decades and have been implementing adaptive strategies to help them cope with the floods during this time. Temporary migration is one of the effective adaptive strategies that the communities living in the flood prone areas implement during floods. This is contrary to how the government and the general public perceive environmental migration as an adaptation strategy, they suggest that permanent relocation is the best solution that would effectively address vulnerability to floods. Ransan-Cooper et al., (2015) presents a clear understanding of perceived vulnerability by various actors, including international organisations, politicians, governments and scholars that suggest that affected communities are helpless. Contrary to such understanding, communities living in flood prone areas engaged with in this thesis are aware that the environment is changing and have designed adaptive strategies that have enabled them to cope with the floods in a way that is beneficial to them.

The communities spoken to during the study indicated that temporary migration during severe floods is normal for them and forms part of their livelihood. They are aware that they have to move during the flooding season and many smallholder farmers have set aside plans that facilitate the temporary migration. Social networks and inter-dependence between the communities living in the flood prone areas and those that live in the upland areas have made temporary migration during floods easier for the communities living in the flood prone arear. The communities living in the upland areas also relocate to flood prone

areas during droughts, thus benefitting from agriculture through moisture in the flood prone areas. The strong relationship between these communities through social networks and interdependence clearly indicates that the smallholder farmers living in flood prone areas are not victims, neither are they security threats to neighbouring communities and country, Mozambique as suggested by some governments (Ransan-Cooper et al., 2015).

However, it is evident that these communities are 'partially' adaptive agents and have become political subjects over time due to external power dynamics. These smallholder farmers are affected by both international and national disaster policies that present them as victims, severely exposed to floods and therefore they are helpless in their environment. The smallholder farmers in the case studies illustrated that permanent relocation to upland area would exacerbate their vulnerability to climate variability and that their livelihood is better managed and sustained in the flood prone areas. The communities indicated that they possess valuable assets such as agricultural land, livestock, bicycles, radios and mobile phones that sustain their livelihood in the flood prone areas.

Secondly, communities exemplified that climate change adaptation strategies and policies in some areas will exacerbate vulnerability to climate variability and create new vulnerabilities that the affected communities will eventually fail to cope with. It is important to realise that the adverse effects on climate change can never be isolated from the political, social economic and cultural factors that interplay in the communities therefore suggesting that the same factors interact to reduce the impact of the disasters (Methsmann and Oels 2014). This thesis presents a unique and important social relation, revealing inter-dependence between the communities living in the flood prone areas and those that live in upland areas. The farming households in upland areas migrate temporary to the flood prone areas during droughts for farming purposes whilst the farming households in the flood prone areas migrate upland temporarily for shelter during floods. This in itself is a novel way of understanding how different communities affected by different climate hazard depend on each other as part of adapting to the hazard. The power of social relations and interdependence is usually undermined in adaptation programmes and policies. Selling of assets has been well articulated as an adaptation strategy (Enete et al., 2016) but this thesis presents evidence of a more sustainable way of utilising the land in flood prone areas through letting out part of the farm land to communities that are affected by drought. Adger (1999) explains that communities that are vulnerable to climate variability will find strategies within their localities within which they can use to adapt to climate variability.

Land is an important and reliable asset for the communities living in flood prone areas because apart from yielding crops and produce from it, it is also a reliable source of income. The motivation to live in the flood prone areas mainly comes due to the possession of land which is used for agriculture and hiring out to communities that live in the upland areas during drought. The seasonality of floods, considering that they do not occur every year, presents a benefit to the communities because the upland communities are affected more with droughts than they are with floods. Overall, in cases where floods do not occur every year, temporarily, migration is an attractive adaptation strategy because the communities still have access to their farmland and possess it permanently which then enables them to rent it out during droughts as an alternative source of income in addition to agriculture.

Thirdly, this research presents evidence that the complexity of local adaptation arises from the political, economic, social, cultural and institutional factors and processes that interplay within the households and communities. Sometimes, these same factors and processes work against effective local adaptation at both household and community level. However, Engle (2011) claims that adaptive capacity of a nation or community that is affected by climate variability is influenced by the institutions, management and governance. The findings presented in this thesis illustrate that at household level, women are not given a chance to contribute to household resilience to climate variability because of cultural values that suggest that women are subordinates and that therefore only men have the authority to actively participate in such developmental activities. For fear that women will become empowered and hence would be 'rude' and 'forget their household roles', men do not allow women to participate in activities that would empower them, thereby retarding household reliance to floods. Most importantly, both women and men are oppressed at household and community level even though due to culture, the oppressed accept the oppression as normal behaviour. Some cultural values work against efforts to make households resilient to floods thereby revealing that the need to address cultural values that households and communities hold to be able to address some fears and myths that work against effective adaptation to climate variability including floods. The need to understand gender issues and social groups should not be undermined as these shape the adaptive capacity of the households and communities (Madhuri, 2016). This study therefore exemplifies the dynamic and complexity of gender roles and expectation within the flood prone areas and women mostly are taken advantage of due to misconception of power and understanding of respect.

In addition, politicians at all levels exacerbate the vulnerability of these communities to floods. It is evident using a Malawi case that politicians are not primarily interested in investing in disaster risk infrastructure, but rather votes. In contrasting evidence Obradovich and Zimmerman (2016) found that across Sub Saharan countries, with evidence from Malawi and South Africa, the voters are not interested with climate change policies and that they do not support the implementation of such policies. This evidence suggest that voters are interested in other things that constitute their welfare therefore politicians respond to those issues to be able to win votes. In the case of Malawi however, as illustrated in this thesis, politicians are actively involved in organising help in the moment when communities are affected by the floods even though they do not invest in longer term and more permanent disaster risk infrastructure. During voting period, the polling stations are positioned in the flood prone areas for voters to vote even though the government stopped providing for amenities in those areas after indicating that those areas are prone to floods and therefore not suitable for occupation. This research highlights a political aspect of vulnerability and local adaptation where politicians are influential but looking for the votes; and how the voters themselves are vulnerable to climate variability, they are not influential, but have the voting power.

Fourthly, it is evident that an effective early warning system is desirable to reduce vulnerability to floods in the flood prone areas. A combination of indigenous knowledge, hydro-geology and sophisticated weather readings is essential to build an effective, reliable, meaningful and trusted early warning system. Flood management in developing countries remains a challenge due to economic, financial and technical challenges (Rahman and Di, 2007). Due to the intensity of the flash floods in Malawi in 2015, the indigenous early warning system there was not able to provide timely warnings to the communities of the flash floods. In addition, the way in which earth and rock movements persisted before the floods came

and communities failed to realise that floods were coming explains how sophisticated the early warning system needs to be. Raju et al. (2016) explains the role of advanced remote sensing technology in predicting flash floods through depicting soil moisture content over time. This thesis suggest that a combination of advanced remote sensing, hydro-geological measurements and indigenous knowledge on the early warning systems needs to be encouraged in order to deal with the complex floods that are more becoming fatal than in previous years.

Fifthly, In terms of adaptive capacity, with reference to the Adaptive Capacity Wheel (Gupta et al., 2010) the thesis illustrates that at both household and community level, leadership, resources and room for autonomous change are very crucial in enhancing the adaptive capacity of the communities It is evident however that processes in fair governance, variety and learning capacity are not adequately present in the areas. Communities and households only achieve half of the adaptive capacity wheel but are partly striving in the flood prone areas. This entails that communities are not homogenous in nature hence factors and processes that enhance their adaptive capacity will vary. With reference to The Local Adaptive Capacity Framework (ACCRA, 2011), however, the thesis provides evidence that the institutions are resource tight, not powerful enough to make decisions and provide sustainable solutions in the flood prone areas. Also, that entitlements are not clearly visible in many deserving smallholder farmers. However, at the household level, the asset base, innovation, knowledge and information, and flexible and forward-thinking decision making was evident in households that are able to cope with the floods.

The findings in relation to adaptive capacity illustrate that household adaptive capacity is critical in flood prone areas and that community and structural responses to climate change are not reliable. An increase in the number of households that are able to cope with the floods on their own without financial support from the government and humanitarian organisation will enhance the adaptive capacity within the flood prone areas. Whilst community work is not totally discouraged, this research provides evidence that understanding households' adaptive capacity portrays a true reflection of vulnerability and adaptation challenges and provides foundation opportunities on how best climate change interventions can be designed.

5.2 Areas for Further Research

This thesis presents findings from research that took place at one moment in time, significantly either side of a major flood event. There is need for other similar studies in the same areas with the same communities in order to find out if there will be significant changes in terms of how these communities will be coping with the floods over time. Such studies would be important in order to highlight if there will be any changes in terms of the adaptive capacity and vulnerability context over a variety of time scales. There is need for research that would seek to find out to what extent women empowerment projects as an adaptation strategy would enhance the household adaptive capacity.

Finally, I would recommend research that will examine, understand and explore the relationship between the state, politicians and voters in the disaster prone areas in order to explore opportunities and challenges that exist between these three groups of stakeholders that are also critical in reducing vulnerability to the effects of climate variability at village and community level.

5.3 Chapter Summary

This study provides evidence that floods have become more severe and fatal in some places, to which communities are having to deal with. In the effort to reduce vulnerability to climate variability, UNISDR suggests that communities that live in flood prone areas should relocate to safe areas to reduce vulnerability to climate variability. The Malawi Government declared some areas in Malawi flood prone areas and requested those that live in the areas to relocate to safer areas. There has been resistance by the affected communities to relocate upland.

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