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WHY DO SMALLHOLDER FARMERS INSIST ON LIVING IN FLOOD PRONE AREAS? UNDERSTANDING SELF-PERCEIVED VULNERABILITY AND DYNAMICS OF LOCAL ADAPTATION IN MALAWI

BY

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DECLARATION

I, Nancy Elsie Chawawa, hereby declare that this thesis is my own work. I have acknowledged the work of others that has been incorporated in the thesis as per the referencing guide. The work in this thesis has not been, and has never been submitted for any other degree or professional qualification other than the doctor of philosophy degree in Atmospheric and Environmental Sciences (Environmental Sustainability) that I am submitting to the University of Edinburgh.

Signature:

Date: **11TH June, 2018**

ABSTRACT

The Government of Malawi, through delegates from the Department of Disaster Management Affairs, has on several occasions advised smallholder farmers who live in flood prone areas to relocate to upland areas that are safe from floods. Smallholder farmers have refused to do so and continue to live in the flood prone areas despite experiencing on-going flooding. Smallholder farmers living in flood prone areas in Malawi insist that flash floods bring fertile soils from upland areas that enhance crop production in the flood prone areas. These fertile soils allow smallholder farmers to grow a variety of crops, fruits and vegetables throughout the year, some of which they sell. Within this context, my research critically explores how smallholder farmers perceive their vulnerability to floods and seeks to understand the factors and processes that motivate them to live in the flood prone areas. It also examines the realities and dynamics of local adaptation in the flood prone areas in Malawi through opportunities, challenges, barriers and limitations. The research uses 57 in-depth interviews, a household survey involving 227 households, participant observations and 12 focus group discussions with smallholder farmers. Findings show that firstly, smallholder farmers are not ready to abandon their land and relocate upland because floods are part of their lives and livelihood strategies. Secondly, that power dynamics at household and community levels based on gender roles and culture need to be understood and accounted for in local adaptation strategies in order to effectively enhance local adaptive capacity. Thirdly, that social networks and interdependence between the smallholder farmers living in flood prone areas and those living in upland areas play a significant role in the adoption of local adaptation strategies and adaptation to floods and droughts through temporary migration. This thesis reveals that the perception and extent of vulnerability to floods is dynamic and differentiated based on several factors. The thesis also reveals that local adaption is a complex process such that in some cases, the realities of power dynamics at both the household and community level affects local adaptive capacity to floods. Transformational adaptation that incorporates specific and contextual adaptation strategies is therefore recommended as one of the best approaches towards achieving successful adaptation to climate variability and resilience.

Keywords: Smallholder farmers, self-perceived vulnerability, floods, flood-prone areas, transformational adaptation, local adaptation.

LAY ABSTRACT

The Government of Malawi has been insisting that smallholder farmers who live in flood prone areas should relocate upland, to places that are safer from floods. The government, through delegates from the Department of Disaster Management Affairs, has on several occasions advised the smallholder farmers to move out of the areas that are exposed to floods permanently to avoid the impact of floods. However, the smallholder farmers have refused to move to the upland areas and emphasise that flash floods bring fertile soils from upland areas that enhance crop production in the flood prone areas. Within this understanding, my thesis explores how smallholder farmers understand their exposure to floods and how they are coping with the floods. The thesis further seeks to understand the issues that motivate smallholder farmers to continue living in flood prone areas. The thesis also investigates the practical aspects of local adaptation in the flood prone areas in Malawi. The data for the research was collected through a household survey, involving 227 farming households, 57 in-depth interviews with key stakeholders, 12 focus group discussions with smallholder farmers, and personal observations during the data collection period. The results indicate that firstly, smallholder farmers are not going to move permanently to upland areas and that they will continue to migrate temporarily during floods. Floods have become part of the smallholder farmers' lives and they utilise them as part of their livelihood. Secondly, that the challenges to cope with the floods within the flood prone areas go beyond the floods themselves; there are social, cultural, economic and political influences that do not assist the smallholder farmers to be resilient to the floods. Thirdly, that the communities that live in flood prone areas have meaningful friendships with communities that live in upland areas; they assist each other during floods and droughts. This thesis reveals that smallholder farmers that live in areas that are exposed to floods have their own way of coping with the floods. The thesis therefore emphasises that there is need to understand how various groups of people respond to climate variability and the specific challenges they face in order to come up with strategies that will meaningfully reduce the impact of the climate variability on their lives and welfare.

Keywords: Smallholder farmers, floods, areas exposed to floods, coping with floods, understanding exposure to floods.

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ACRONYMS

ACCRA: Africa Climate Change Resilience Alliance

ACPC: Area Civil Protection Committee

CA: Conservation Agriculture

CDKN: Climate Development Knowledge Network

DCPC: District Civil Protection Committee

DDP: District Development Plan

DoDMA: Department of Disaster Management Affairs

FAO: Food and Agriculture Organisation

FGD: Focus Group Discussion

GVH: Group Village Headman

GoM: Government of Malawi

HFA: Hyogo Framework for Action

HS: Household Survey

IPCC: Intergovernmental Panel on Climate Change

KII: Key Informant Interview

NAPA: National Adaptation Program of Action

NGOs: Non-Governmental Organisations

NSEP: Nsanje Social Economic Profile

NSO: National Statistic Office

OCHA: United Nations Office for the Coordination of Humanitarian Affairs

ODI: Overseas Development Institute

SEP: Social Economic Profile

SFDRR: Sendai Framework for Disaster Risk Reduction

TA: Traditional Authority

UNDP: United Nations Development Programme

UNFCCC: United Nations Framework – Convention on Climate Change

CHAPTER ONE: 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 how smallholder farmers 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 through a political ecology lens. 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 Motivation of the Research

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[1], 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 smallholder farmers 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.

[1] Department of Disaster Management Affairs

In 2012, the smallholder farmers 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 smallholder farmers 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 smallholder farmers living in flood prone areas to relocate upland so that they should reduce the impact of floods on their lives. However, the smallholder farmers have refused to relocate and have insisted on living in the flood prone areas. Even after the 2015 floods, the majority of the smallholder farmers moved back to the flood prone areas (Nsanje District Council, 2015b). Currently, there is no data that explicitly explains the factors that motivate the smallholder farmers to live in flood prone areas. However, there have been claims from various individuals through the media, that suggest that the smallholder farmers 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 smallholder farmers 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[2] 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

[2] A District Development Plan is a document that comprises of a consolidated plan from a sector that guides the development agenda at District Level.

cannot cope with the floods. Recently, there has been an increase in the number of smallholder farmers 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 smallholder farmers 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 smallholders face which have exacerbated their vulnerability to floods.

1.2 Personal Experience and Interest

I am a Malawian by nationality and have worked under the Department of Environmental Affairs as an Environmental District Officer for 7 years. Between February, 2010 and March, 2012, I worked in Nsanje District in the same position. During the time that I was working in Nsanje, it was clear that information was lacking on how the smallholder farmers perceived their vulnerability to floods and climate variability. Secondly, there was no information on the factors that motivate these smallholder farmers to continue living in the flood prone areas. Thirdly, it was well known that smallholder farmers were still becoming more vulnerable to floods and climate variability and were struggling to recover after experiencing the floods despite all the climate change adaptation projects. With all these facts, what remains unknown is why these smallholder farmers would continue taking the risk of living in the flood prone areas and how effective the early warning system is to help minimise the damage and loss of property and life.

During disaster and stakeholder meetings in the District, there have been claims from some government officials, stakeholders and communities in upland areas that these smallholder farmers are motivated to continue living in flood prone areas because of the relief items such as maize flour, legumes and cooking oil amongst other things that they receive after experiencing floods (Nsanje District Council, 2010a). In addition, some government officials indicate that the smallholder farmers were ordered to move upland, even though the relocation process was not clear in terms of who takes the responsibility of compensation fees and facilitation of the relocation negotiations between the flood victims and the communities that live in

upland, safer areas. The assumption made by the government is that the chiefs and communities will negotiate amongst themselves and sort out all the logistical issues that are associated with compensation and relocation.

On the contrary, some smallholder farmers that would want to move upland claimed that the politics and cost of compensations without the government being involved is more complicated and costly for them hence they are left with no choice but to continue living in the flood prone areas. These unsubstantiated claims and unrealistic assumptions and unanswered questions about the smallholder farmers living in flood prone areas led to this research. This research sought to understand how these smallholder farmers interact with their environment by examining vulnerability and power dynamics in the flood prone areas, and the complexity of local adaptation in order to inform climate change and disaster related policies and add knowledge in the field of political ecology. This research contributes knowledge on how different actors perceive the vulnerability of environmental migrants to climate variability and therefore design climate change adaptation strategies that reflect their perception. This thesis therefore also contributes to debates around framing environmental migrants by focusing on the way the environmental migrants themselves perceive their vulnerability to floods, thereby contributing towards framing their vulnerability, and how they cope with the environmental changes. This thesis also explores the early warning system that is used in the flood prone areas as a way of preventing the disastrous effects of floods on their lives.

1.3 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 smallholder farmers 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 two 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).

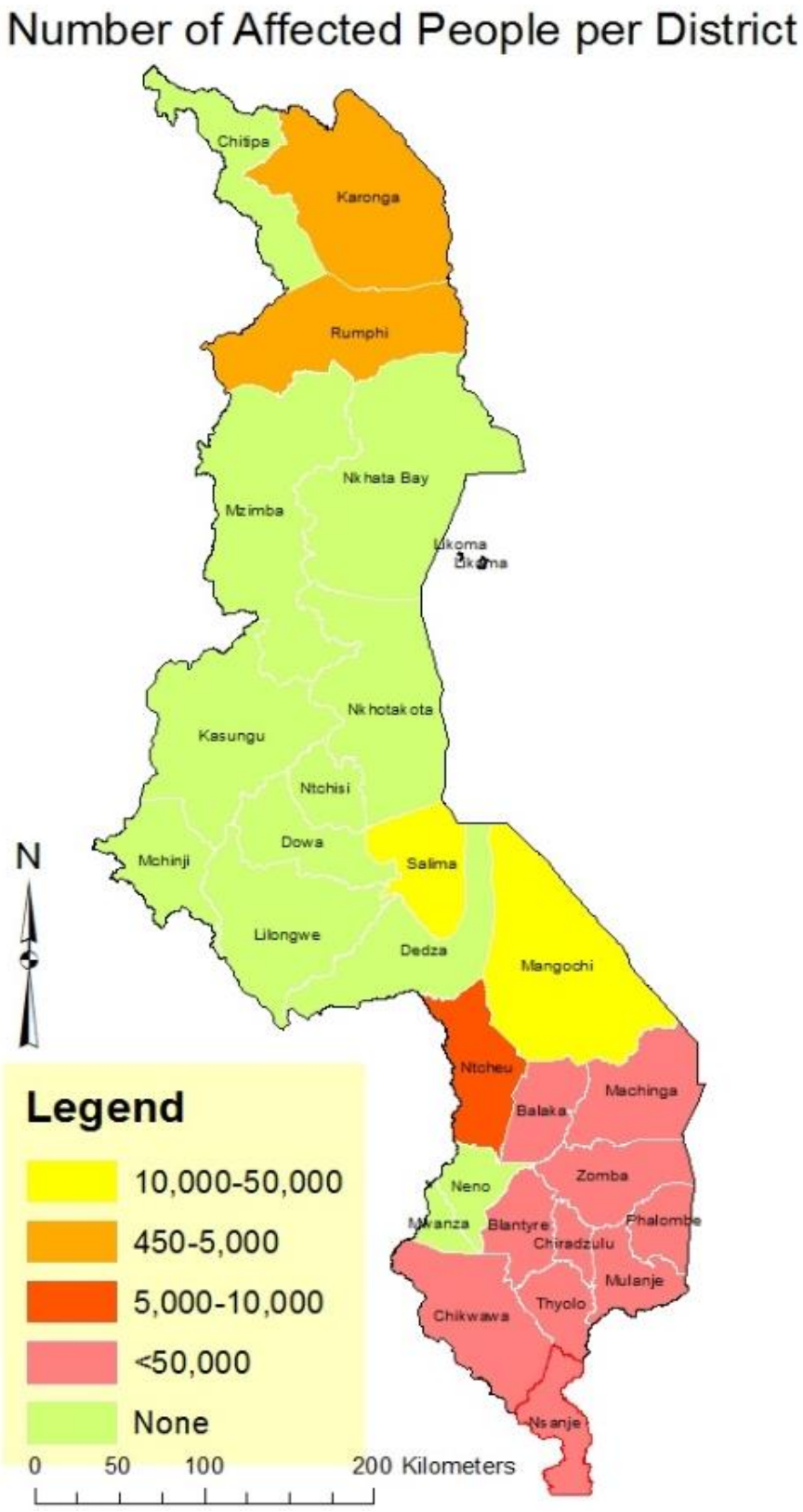
Due to various differences in factors contributing to vulnerability, adaptation measures are also different and they depend partly on culture, geographical positions, local and institutional changes, and power (Bougsty-Marshall, 2016). Goldman and Riosmena, 2013; O'Brien and Wolf, 2010). The differences 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 and Blantyre Rural Districts in Malawi as case studies. 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.

1.4 Research Context

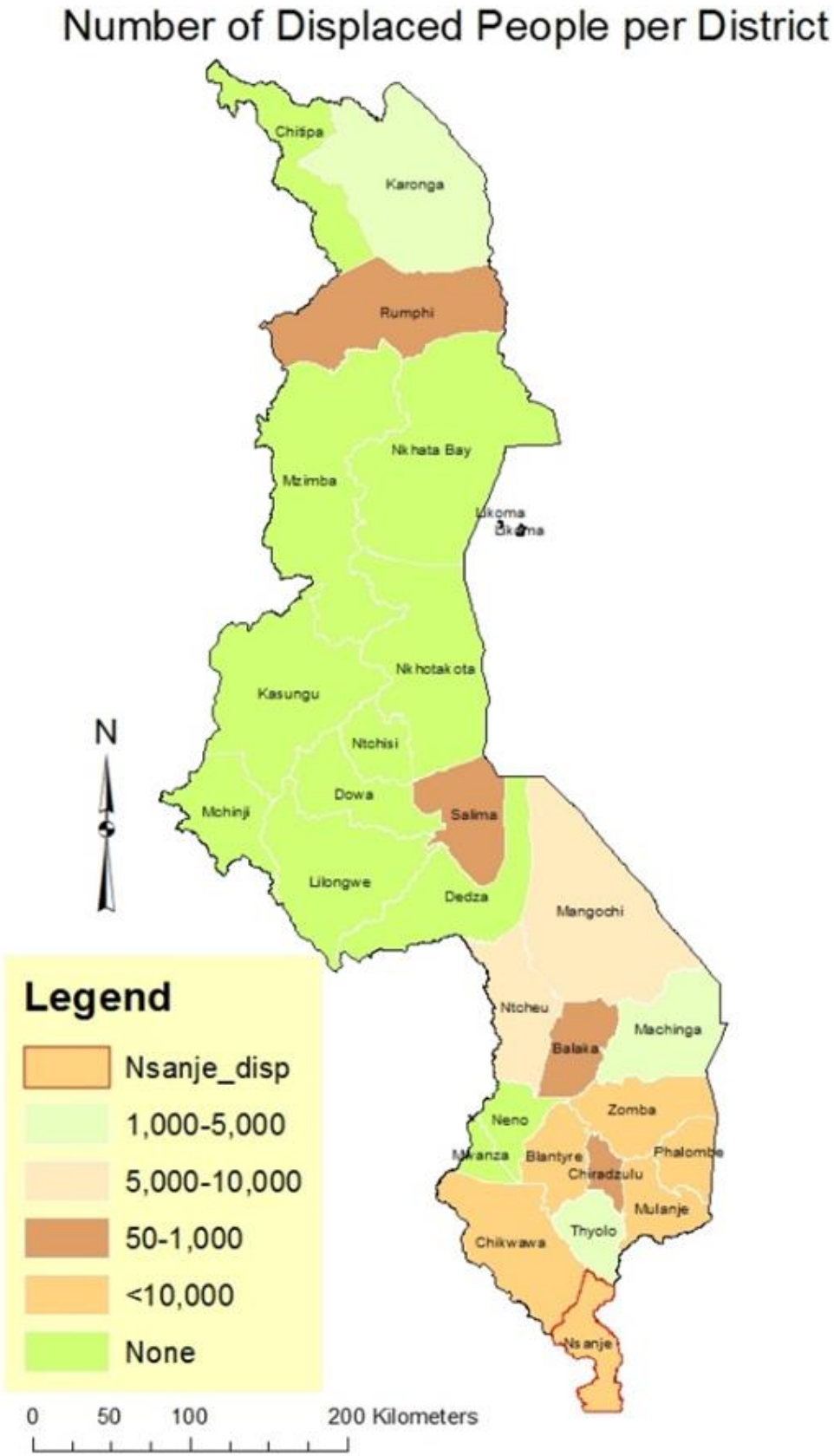
In Malawi, regardless of the efforts to make households and communities resilient to climate variability through climate adaptation related projects as stipulated in the National Adaptation Plans of Actions, evidence from post disaster assessments in 2012 and 2015 (GoM, 2012, 2015) indicate that the 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 (Map 1 and 2)

Map 1 Number of Affected People in 15 Districts in Malawi



Source: United Nations Office for the Coordination of Humanitarian Affairs (OCHA)

Map 2 Number of displaced people in 15 districts



Source: 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
Infrastructure	Housing	60,414	139	76,230	175
	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 smallholder farmers living in Africa because agriculture is their main source of income. A better understanding of smallholder farmers' 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 and

Blantyre Rural 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 smallholder farmers 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 socio-cultural environment and the interaction between political and economic factors within flood prone areas.

1.5 Research Objective

The overall aim of the research was to understand how smallholder farmers 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 programmes in the flood prone areas.

1.6 Research Questions

1. How do smallholder farmers living in flood prone areas perceive their vulnerability to floods?
2. Why are smallholder farmers motivated to stay in flood prone areas?
3. What are the factors that have caused the smallholder farmers living in flood prone areas to continue being vulnerable to floods?

1.7 Theoretical Framework

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.

1.8 Methodology

This thesis is based on fieldwork that was conducted with smallholder farmers living in flood prone areas of Traditional Authorities Mlolo, Mbenje, Nyachikadza and Ndamera in Nsanje District, and in Traditional Authority Kunthembwe in southern Malawi, over the course of 10 months in 2015. Data was collected through 227 household surveys, 12 focus group discussions and participant observation in the flood prone areas. In addition, 57 in-depth interviews were conducted comprising of smallholder farmers living in flood prone areas, smallholder farmers living in upland areas (near the flood prone areas), chiefs, committee members living in the flood prone areas and various stakeholders working in the area, including government officials and other officials working in non-governmental organisations who are implementing projects in the flood prone areas.

Out of the overall sample, a survey with 19 households, 3 focus group discussions and 10 key informant interviews were conducted in Traditional Authority Kunthembwe in Blantyre District. The aim was to further understand the different

contexts of vulnerability and extent of exposure to floods within the Shire River catchment. Blantyre and Nsanje Districts are within the same Shire River catchment, with Blantyre being in the Middle Shire and Nsanje in the Lower Shire Valley. Both Districts were heavily affected by the floods during the January, 2015 floods and have been prone to flooding for over a decade (DoDMA, 2012).

The data was analysed based on four important themes that described how smallholder farmers perceive their vulnerability to floods, the factors that motivate them to continue living in flood prone areas, opportunities in flood prone areas and the challenges, in terms of barriers and limitations to successful local adaptation to floods. This analysis enabled me to understand the context within which smallholder farmers become vulnerable to floods and how based on their context, they can effectively reduce their vulnerability to floods. This is very important because it reveals important specific local adaptation opportunities that need to be supported and challenges that need to be addressed in the fight against vulnerability to climate variability.

1.9 Thesis Layout

Chapter 1 provides an introduction to the research. It presents the motivation of the study and why it was important to conduct the study. The research aim, research questions that guided the research and the political ecology theoretical framework within which I have discussed my findings are also introduced. Furthermore, it briefly describes the main case study, Nsanje District to describe the context in which this research was conducted and the methods which were used to collect the data. Finally, it highlights the knowledge gap the research addresses in vulnerability, power dynamics and local adaptation, and that it contributes to political ecology studies.

Chapter 2 presents the literature that was reviewed which is relevant to the study. There are thematic literature reviews on vulnerability that reviews scholarship from Adger (1996a; 2006) and Ribot (1995; 2014) amongst other scholars on what vulnerability is, context of vulnerability and the intrinsic factors that exacerbate it. Furthermore literature from Arnall (2014), Bougsty-Marshall (2016), Harrison and

Chiroro (2016) and Ioris (2012) on adaptive capacity, power dynamics and the early warning system as aspects that either reduce or exacerbate vulnerability to floods and droughts on smallholder farmers has been reviewed. Under the main themes, there are sections on how social institutions, gender roles, international and national climate and disaster related policies, and climate information interplay in local adaptation processes in order to enhance the interaction of my findings with the available literature from political ecology.

Chapter 3 presents the case studies. This chapter unpacks the case study approach and describes the areas where this research took place; and boundaries within which the findings are drawn from (Crowe et al., 2011). The chapter describes Nsanje and Blantyre Rural Districts as case studies, with relevant information that characterise them, in terms of vulnerability to floods, local adaptation and general livelihood activities.

Chapter 4 presents my methodology by firstly indicating that the study followed an interpretivist epistemology (Evely et al., 2008). It describes the purposive sampling that I used to collect data (Palinkas et al., 2013; Palys, 2008; Suri, 2011). It also provides detailed information on the mixed methods approach that I used to collect both quantitative and qualitative data and methodological triangulation (Barbour, 2011; Crowe et al., 2011; Mason, 2002; Stake, 1995). Quantitative data was collected through household survey, whilst qualitative data were collected through key informant interviews, focus group discussions and participant observations. In addition, it describes how the collected data were recorded, coded and analysed, using SPSS for descriptive statistics to manage quantitative data and NVivo for qualitative data. The data was analysed based on the factors that influence self-perceived vulnerability to floods, factors that motivate the smallholder farmers to live in the flood prone areas, and the various opportunities and challenges in terms of local adaptation in the flood prone areas. These factors enabled me to understand the dynamics of vulnerability to floods and local adaptation in the flood prone areas hence contributing to knowledge on reducing vulnerability to climate variability.

Chapter 5 presents findings and discussions on framing vulnerability based on self-perceived vulnerability. This chapter reveals that smallholder farmers living in flood prone areas mainly perceive vulnerability to floods and climate variability as a natural phenomenon that is prevalent in many areas. Vulnerability to climate variability is dynamic; whilst some communities are affected by the floods, other people are affected by droughts, dry spells and strong winds. The findings therefore suggest that public perception towards vulnerability to floods does not reflect the way the affected people frame their vulnerability to floods based on their self-perceptions. The smallholder farmers indicated that they have been experiencing floods since 1952 and that floods are part of their livelihood. The smallholder farmers however indicated that the January 2015 floods were the worst so far due to their intensity and extent of damage. This chapter also presents that self-perceived vulnerability to floods should not be generalised because it is unequally distributed and is differentiated by several factors that include spatial locations, age, gender and personal encounters with the floods and ability to cope with the floods.

Chapter 6 presents the factors that have motivated the smallholder farmers to continue living in the flood prone areas despite being advised to relocate to safer places. The factors include presence of fertile soils after the floods, farming style of growing various crops throughout the year, families, general livelihood, social networks, cultural heritage and free access to farm land that has been inherited from their ancestors. Smallholder farmers that live in upland communities migrate to the flood prone areas during droughts hence the smallholder farmers who live in the flood prone areas emphasised that they are better off living in the flood prone areas where they are never affected by the droughts. These factors present evidence that some disaster related policies are generalised and that in some cases, these policies are not applicable therefore should be adjusted accordingly to suit the different places. This thesis illustrates that people stay in flood prone areas for various reasons, some of which are related to their livelihood, identity, culture and lack of adequate resources that would facilitate the resettlement process. These issues need to be incorporated in adaptation policies and programmes through effective engagement with the people that these policies and programmes are designed for.

Chapter 7 presents findings and discussion on practices of local adaptation to floods. Various assets including land, livestock, bicycles, radios, mobile phones and social networks help communities to cope with floods during and after the floods. Changes in crop production and post harvesting handling as a result of climate variation, including floods is presented as part of local adaption to floods. Land is a hugely important asset because apart from farming, it is a source of livelihood. During droughts, the smallholder farmers that live in upland areas rent part of the agricultural land in the flood prone areas. The interdependence of smallholder farmers living in the flood prone areas and those living in upland areas reveal that temporary migration is one of the best adaptation strategies and that permanent migration would exacerbate vulnerability to climate variability, including floods in some areas. In situ adaptation to floods is therefore important as an adaptation strategy and should be encouraged where there is evidence of success. In addition, this chapter indicates that various local institutions such as communities and households, and organisations such as churches, schools, police, civil society organisations and civil protection committees that are situated in the flood prone areas play significant roles during and after the floods in the flood prone areas.

Chapter 8 presents the barriers and limitations to permanent migration, as called for by development actors including government and civil society. It presents arguments that relocating to safer places is a longer process that should involve compensation and support for livelihood changes which are not clearly mentioned at national and international forums. The relocation process therefore is in practice more sophisticated than it is presented in these forums. There are several other factors and processes that are critical in the relocation process that are ignored in current negotiations, policies and programmes. The chapter also examines the assessment by the smallholder farmers that there is inadequate space for both settlement and farming in the new areas of relocation, an issue which is overlooked by decision makers in government and civil society. The chapter furthermore illustrates that compensation costs are not mentioned in the arrangements and yet they are part of the fundamentals of resettlement according to communities asked to move.

Chapter 9 illustrates that a radical transformation is needed in how state agencies, policy makers and donors approach adaptation issues. It exemplifies how the socio-cultural processes within a particular economic and political environment in the flood prone areas interplay thereby helping smallholder farmers to cope with the floods during the flooding season and in some cases how they interplay to work against adaptation to floods. The early warning system is discussed, a combination of both the local knowledge and information from the meteorological department as part of adaptation to floods. It reveals that there are inefficiencies in the way climate information is generated, interpreted and distributed; and how the smallholder farmers receive the information, the type of information they receive and what they do with the information. This thesis emphases that the climate information that is generated by the weather stations and meteorological department in most cases is not sufficient (Howard et al., 2017) to enable the affected populations, policy makers and stakeholders to make climate related decisions that will reduce their vulnerability to climate variability. The inefficiencies have prevented the smallholder farmers from escaping the floods on time and with their belongings, including harvested produce, livestock and household items. It argues that indigenous knowledge is no longer a reliable means of an early warning system in flooding communities where flash floods are involved. It also presents a discussion on how climate related policies to some extent do not address the adaptation needs of the communities that are affected thereby exacerbating vulnerability to the negative effects of climate variability including floods.

Chapter 10 concludes the thesis. It reflects on how smallholder farmers are framed by different actors (Ransan-Cooper et al., 2015). It highlights that smallholder farmers perceive themselves as adaptive agents and that they see themselves as political subjects that are affected by the presence and absence of the state in the flood prone areas. The chapter presents the thesis highlights which contribute to knowledge in vulnerability and adaption studies. It summarises the realities of who makes decisions, who benefits, what type of benefits the people are entitled to and why many adaptation projects are not achieving the ultimate goal of resilience. This research is important because it presents evidence of how several factors including the natural, social, economic, cultural, technical and political have created,

exacerbated and reduced vulnerabilities to floods in the flood prone areas and therefore suggests how in situ adaptation to floods in flood prone areas is vital to sustain the livelihoods of the communities that live there.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature on vulnerability to climate variability, 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 summarised and ways in which this research fits into the wider academic discourse on vulnerability and local adaptation. This thesis recognises 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 (Pelling, 2010).

2.2 Vulnerability to Climate Variability

2.2.1 Background

Global temperatures are increasing with the likelihood of massive consequences on the climate, human beings and various ecosystems that cannot be ignored (IPCC, 2013). Developed countries are producing more greenhouse gases that enhance global warming and exacerbate climate variability which is highly affecting developing countries (Samson et al., 2011). The Intergovernmental Panel on Climate Change third report (2001, p995) defines vulnerability, exposure, sensitivity and adaptive capacity as presented in the table 2:

Table 2 Definition of Key Terms in Climate Vulnerability and Adaptation According to the IPCCC (2001, p.995)

Key Word	Definition
Vulnerability	*'the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and adaptive capacity'*
Exposure	'*nature and degree to which a system is exposed to significant climatic variation*'
Sensitivity	*'degree to which a system is affected whether adversely or beneficially, by climate related stimuli directly or indirectly,*'
Adaptive Capacity	*'ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences'*

Developing countries have less capacity to deal with the consequences of the phenomenon, including, but not limited to floods and droughts (UNISDR, 2005; UNISDR, 2015). Developing countries are significantly more vulnerable to climate variability because they largely depend on climate favourable conditions for their livelihoods, unlike developed countries that largely depend on productions through various industries (Samson et al., 2011). Developing countries mainly depend on agriculture for their livelihood hence the unfavourable climate conditions affect agricultural production and thereby affecting the livelihood of the people and the countries' economies (Ibid).

Developed countries contribute significantly towards global warming and have the potential to deal with the climate shocks in many cases whilst developing countries continue to struggle due to poverty (Olsson et al., 2015). The effects of climate variability, risks to disaster and the capacity to cope and adapt to these disasters are unevenly distributed, thus there is an injustice (O' Brien et al., 2012). Poor populations and countries suffer more and yet they do not have the capacity to cope and adapt to the effects of climate variability whilst the wealthy also suffer but the

impact is less due to the ability to cope with the effects (Ibid). Vulnerability is therefore exacerbated by global injustice and is socially constructed[3] where due to power relations and global inequalities, countries in the global South suffer more for the problems that are exacerbated by countries in the global North due to their production patterns. Poverty contributes towards vulnerability to climate variability differently at global, regional, national and local level, where the poorest at all these levels are more vulnerable than those that are better off economically and socially (Olsson et al., 2015).

The socio-economic status of the communities plays a significant role in vulnerability research and can never be ignored (Adger, 1996). The socio-economic status plays an important role to distinguish vulnerability between and among individuals, households, communities, nations and regions (Adger, 1996). Vulnerability is also differentiated into individual and collective vulnerability, where individual vulnerability is exacerbated by relative poverty, deprivation and informal social security and collective vulnerability is exacerbated by poor infrastructure, the role of state and relevant institutions (Adger, 1999). These assertions arise from a study which was conducted in Vietnam where the implication of levels of poverty, inequality and effectiveness of institutions have largely been reflected in global, regional, national and local poverty (Ibid). This claim is also evident in various studies, including recent studies (Pelling, 1999; Sen, 2009; Ioris, 2012; Ajibade and McBean, 2014; Padawangi and Douglass, 2015) therefore illustrating an integration of wider literature in vulnerability studies since 1999. Furthermore, vulnerability to climate variability in individuals, communities and nations change over time and is dependent on the incidence and extent of the extreme weather events (Adger, 1996).

In the early days of vulnerability studies, Adger (1996) presents a description of vulnerability which suggest that regardless of location, the higher social economic status of individuals is important as this helps the affected people to adapt with climate variability. Olsson et al. (2015) presents vulnerability as a global issue in

[3] Vulnerability being socially constructed in this case means that sometimes, apart from natural hazards, vulnerability is created and exacerbated through social interactions that includes power relations, politics, poor resource management and corruption amongst other factors.

which the global South will be more vulnerable to climate variability. They do not contextualise vulnerability to climate variability thereby assuming that communities in the global North would not struggle to cope with climate variability. The remarkable aspect of literature presented by Adger, (1999), Pelling, (1999) Sen, (2009) Iris, (2012), Ajibade and MacBean, (2014), Padawangi and Douglass (2015) is that whilst admitting that the increase in temperatures has contributed to vulnerability, they go further to examine how vulnerability is created and what factors have exacerbated vulnerability at the local level. My study contributes to this literature by looking at how smallholder farmers living in flood prone areas perceive their vulnerability to floods, what exacerbated vulnerability at both household and community and how they cope with the floods. This study presents findings at a finer scale to contextualise vulnerability and adaptation at the local scale where the vulnerability is evident and where adaptation takes place.

2.2.2 Vulnerability in Context

'Vulnerability is a multidimensional concept encompassing biophysical, socioeconomic, political and ethical factors' (Turner et al., 1996 p.164). The authors indicate that even though emphasis is made on the poor being more vulnerable to floods, the rich are also vulnerable due to high economic losses (Ibid). This does not indicate however that the poor do not suffer any economic losses. The comparison was mainly based on the capacity to acquire wealth and valuable assets, where the poor have less capacity to acquire assets hence losing less during floods (Turner et al., 1996). Mahanta and Das (2017) argue that flood cause vulnerability to poverty. This means that where people become prone to poverty due to lo of assets. The relationship between people being vulnerable to floods due to poverty and people being vulnerable to poverty due to floods creates another aspect of indirect vulnerabilities that is critical in vulnerability studies. Describing vulnerability as a multidimensional concept suggests that there are several factors that determine individual or collective vulnerability. The emphasis on vulnerability to poverty due to floods is vital in disaster studies as it shows how some processes are related and therefore form a vicious cycle. Furthermore, the relationship between poverty and disasters suggests that after addressing poverty issues, the affected people will be able to cope with disasters; and reducing the impact of disasters in the areas, the

affected people will become better off in terms of their socio economic status therefore reducing poverty levels. Reducing the impact of disasters implies that there will be either fewer or no losses due to floods therefore communities will be able to accumulate their assets. This important element in understanding vulnerability illustrates that vulnerability to floods is multidimensional and is exacerbated by both direct and indirect factors and processes that need to be unpacked.

Bauer and Scholz (2010) indicated that the Southern African region was warming up faster than the rest of the world, and yet it was one of the world's poorest and most vulnerable regions. The region is becoming more vulnerable for several reasons, including but not limited to lack of adequate resources such as finances to adequately handle the climate change effects (Ibid). At community and national level however, vulnerability depends on institutional capacity in terms of national wealth, culture and how indebted the nation and or community is (Turner et al., 1996). It therefore reflects how broadly information, economic markets and policy failure play a major role in exacerbating vulnerability in areas that are vulnerable to climate variability (Ibid). These factors also reveal how complex adaptation to climate change is as it depends on the unpredictable weather events hence affecting the effective planning and implementation of adaptation programs over time.

There is need to note, however, that the high levels of scientific uncertainties relating to climate related threats have been complex for over two decades and depend on socio-economic dimensions (Turner et al., 1996). Their findings suggest that scientific uncertainties are worse off in developing countries that currently do not have enough resources to invest in meteorological technology. Furthermore, countries that have outdated technology for weather forecast have high technical errors which produce unreliable climate data and insufficient climate information. Cases are different and need to be studied separately within the context through which the nature interacts with all the socio-economic, political and other factors. This indicates that creating generalisations can be problematic, even when comparing communities with similar socio-economic status and environmental settings that can have similarities.

Different societies face different environmental hazards and coping mechanisms and capacity differ within the systems revealing that vulnerability and adaptation is dynamic and socially differentiated (Adger, 1999a; Adger and Kelly, 1999). Most importantly, various social scientists argue that vulnerability is socially constructed due to inequalities at global, regional, national and local level (Leach et al., 1997; Ribot et al., 1996 Adger, 1996; Bohle et al., 1994; and Watts and Bohle 1993). This thesis focuses on inequalities are local level where households and communities are the main focus. At household level, Taylor (2013) indicates that relative household vulnerability to climate variability is influenced by the household control over productive assets including, but not limited to land, credit and labour. Drawing on differences in vulnerability context and adaptation strategies, this study therefore reflects on vulnerability as a concept and focuses on Nsanje and Blantyre Rural districts in Malawi as case studies, where access to credit is very limited and many smallholder farmers do not qualify for credit facilities and opportunities for labour are limited. These case studies are used to understand how smallholder farmers in such environments perceive their vulnerability to floods, the context to which these smallholder farmers are vulnerable to floods, factors that exacerbate their vulnerability to floods; including the biophysical, socioeconomic and political factors, and how they have been coping and adapting to floods.

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 suggest that communities with different socioeconomic status and perhaps culture, values and community myths, will have different coping and adaptation strategies.

The above two sections of literature review on vulnerability indicate that vulnerability is differentiated based on global inequalities and injustice, spatial locations and socio-economic factors which determine the capacity to cope and adapt to the environmental changes. My study adds to this field by examining how vulnerability is perceived by the people who experience the floods, how they differentiate their vulnerability and exploring what specific factors create and exacerbate their vulnerability to the floods. This thesis also examines how the smallholder farmers 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 the next section, I review different aspects of vulnerability to floods in order to understand the ways in which differentiated people cope and adapt to climate variability, including floods, at various spatial scales.

2.2.3 Gendered Dimensions of Vulnerability

In this section, the focus is on various processes and issues that suggests that vulnerability is gendered in flood prone areas. 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.

2.3 Adaptation to Climate Variability, Including Floods

2.3.1 Background

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.

In farming 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.

2.3.2 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 lead 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 are 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.

2.3.3 The role of Institutions and power dynamics in adaptation

In this thesis, institutions are defined as 'systems of established and embedded social rules that structure social interactions' (Hodgson, 2006). Relevant institutions at various levels, including the state, comprise social relations and local operations of power involved in dealing with floods (Bougsty-Marshall, 2016). These institutions, which can be either formal or informal, operate as a set of principles, values and norms of a particular society and ultimately govern and lead the implementation of adaption strategies (Ibid). This suggests that power relations play an important role in vulnerability and adaption studies in that they order the way certain practices are managed at either household, community or national level. However, it depends on

how power is perceived at various levels and to what extent it influences vulnerability and adaptation. There is need to further understand how various institutions utilise the power they have, and to what extent the power they have influences effective adaptation to flooding.

According to Khan, and Roberts (2013), it was observed that initially global institutions such as the UNFCCC and other Climate related institutions focused on mitigating climate change effects which are long term in nature. The effects of climate change such as floods and droughts that led to food insecurity needed to be addressed within the short term whilst also investing in long term mitigation strategies. Their findings reveal that the effects of climate change cannot be dealt with at once, therefore requiring means of coping with them, to be able to adapt. This also suggest that climate variability issues are complex and that they cannot be dealt with permanently but rather that they should be incorporated in the social, economic and political decisions and processes in order to sustain livelihoods. Inadequate integration of the relevant factors and processes at various level has exacerbated vulnerability to climate variability at various levels. The social injustice occurs within institutions at various levels and it is transferable from international institutions to institutions at national level, then eventually to local level institutions, thereby generating problems that are also transmissible in nature (Thomson et al., 2010). The transmissible nature of adaptation challenges and power relations at institutional levels exacerbates vulnerability at local level thereby complicating power relation problems that can never be addressed at local level.

Some governments that prioritise adaptation issues lack informed and structured decision making during the planning process and thus fail to deliver appropriate and timely adaptation initiatives (Haque, 2016). Furthermore, the lack of clear priorities at national level on climate change adaptation affects the implementation of climate change adaptation policies in developing countries (Zuka, 2015). The lack of clear priorities, and informed and structured decision making at national level, distracts strategic and effective delivery of climate related programs at all levels. Furthermore, it suggests some of the factors that have contributed towards failure in climate related projects at both national and local level. Although National Adaptation

Programmes of Action exist in some countries, including Malawi, implementation of such programmes remains a challenge. Zuka (2015) suggests that unstable donor funding to implement effective adaptation strategies and low institutional capacity are the major challenges in local community adaptation to floods and climate variability. It is therefore evident that there is lack of proper planning and prioritisation of climate related activities at the national level. A lack of planning leads to inadequate preparation for disasters such as floods and droughts at national level which eventually leads to crisis when disasters strike.

Adger (1999) suggests that a decrease in collective action for risk management by state institutions is exacerbated by inaction in some aspects of the decentralised state planning system. The decentralised systems however are sometimes inactive due to inadequate financial and technical resources to address the challenges that they are responsible to handle. Civil institutions form a counterbalancing institutional adaptation where they become more active than decentralised structure due to donor support they receive for projects. This suggests that there are cases where collective action and coordination at both international and national level is compromised due to factors beyond their control. Furthermore, this suggests that under those circumstances, the most affected communities at local level would find means of dealing with their own problems within their level of influence through local NGOs. This suggests that in some cases, these NGOs and local communities can have experience in dealing with vulnerability and adaptation issues unlike the decentralised government structures. Adaptation can therefore be understood in context by learning from those that are vulnerable to the climate risks and therefore experiencing the effects of climate variability because to some extent, they develop strategies of dealing with their problems within their context of vulnerability. This thesis examines the effective adaption strategies to climate variability in the flood prone areas based on adaptation practices that are being implemented by the vulnerable communities themselves, even though they are limited in terms of power, resources and influence at broader perspective to influence the type of adaptation measures they would want to be supported with.

With various social injustice debates at both national and international level, it is important to carefully understand and examine how powerful institutions are at various levels in terms of being able to manage disasters and other challenges they face. Eriksen et al. (2015) suggest that different institutions claim to understand vulnerability issues and exercise their powers to sincerely address vulnerability issues based on the legitimate knowledge and understanding. The best people who can understand vulnerability and coping mechanisms are the people who are vulnerable themselves because they have experience and local knowledge on the challenges they face and how to manage them. This therefore justifies the suitability of a political ecology approach to understanding vulnerability, which seeks to understand and unpack how different factors interplay in a particular area and the power relations expressed in how the affected people address their vulnerability to environmental changes. This thesis therefore is based on the political ecology understanding to unpack the power dynamics at various levels and in various institutions.

There is a strong connection between vulnerability, adaptation and resilience in that a system that is able to cope with for example floods in the short term becomes resilient in the long term and hence not vulnerable to the floods (Manyena, 2006; Gaillard, 2010). Findings indicate that resilience to floods can only be attained if communities are empowered to cope with floods and therefore adapt to floods (Ibid). The question however is whether the adaptation programs are designed to empower communities such that they would become resilient to floods in the long term. The answers to the question require critical assessment on adaptation strategies that are implemented at both local and national level in order to identify areas that negatively affect effective adaptation to flooding and resilience. It is important therefore to further understand power relations in communities to reveal specific power dynamics within communities and at national level and how neoliberalism, natural competition and individualism affect adaptation at all levels (Taylor Aiken et al., 2017). Power relations at various levels, within different gender, culture, socio-economic status, values and norms and with varying development approaches suggests that inequalities occur at various levels either intentionally or unintentionally. Social injustice therefore needs to be unpacked in order to remove barriers to successful

local adaptation that have unintentionally exacerbated vulnerability to disasters and exposure to extreme poverty.

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 decentralised 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.

Resilience has been discussed in various fields including health, development and social science and tends to cover both ecological and either social, community and household entities (Langridge et al., 2006). Household resilience is being defined as the graduation from being destitute and helpless after a flood due to poverty and vulnerability to floods, to where a household is able to cope with the floods and maintain its livelihood, socially and economically after the floods (Enfors & Gordon, 2008). The comparative vulnerabilities within vulnerable communities illustrate the need to have different and unique adaptation strategies that can address the negative effects of climate variability at local, national and regional level (Baptiste and Kinlocke, 2016). Godfrey and Torres (2016) indicate that apart from the social, political and economic factors, vulnerability is differentiated based on race, class and gender amongst other factors. Unpacking the other factors that have contributed to the differentiated vulnerability amongst the communities that are heavily affected by the negative effects of climate change would result into transformational adaptation that is meaningful to the affected communities.

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.

The claim that African voters are not interested in supporting climate change policies (Obradovich and Zimmerman, 2016) is another indication that those who are heavily affected by the effects of climate variation are in a minority and therefore not given a platform to influence climate related policies. However, the fact that their votes still count during elections regardless of their minority should create a negotiation platform between those who are likely to be affected by the climate change policies and the politicians. The results that voters are not interested to support the climate change policies therefore I assume is based on the realities that the majority of the people who have the influence and power would not benefit from the implementation of the policies. In addition, it illustrates that voters sometimes are more interested in

short term priorities that will address their immediate livelihood need than long term plans that address their needs indirectly. In another context, it presents how excluded the people who are heavily affected by climate variability issues are in the formulation and implementation process of climate change policies.

Resettlement is another political process that constitutes social injustice amongst the flood victims and between the state and the flood victims (Arnall, 2014). In an example of resettlement in Mozambique, the hydro-power system that has been planted into the Zambezi River has exacerbated vulnerability to floods and need for the flood victims to relocate to safer areas (Ibid). However the study clearly indicates that the state benefits from the hydro power company through tariffs and other political gains whilst the flood victims that were evacuated do not benefit from anything relating to the relocation process. People who are affected by the floods are continuously victimised because they are powerless therefore unable to defend their land ownership. Whilst the process ensures government's economic stability, the flood victims struggle to manage their livelihoods in relocated areas (Arnall, 2014). These social injustices reflect how some public policies are biased towards fulfilling the governments' agendas in promoting capitalist interest while importantly neglecting the needs of the less privileged where there are competing interests. Moreover, it reflects how helpless the affected communities are to make decisions that would benefit them therefore it raises questions on whether the public policies aim to address the challenges of the people they are meant to serve when their voice is not incorporated (Ajibade and McBean, 2014; Padawangi and Douglass, 2015). The thesis, in part, unpacks the unvoiced social injustice and inequalities in flood prone areas in order to understand vulnerability and barriers to local adaptation in context, considering that cases are different and are affected by different factors. In Bangladesh for example, migration has proven to be a viable strategy that has improved the livelihood of the people affected by floods whilst those who refuse to relocate remain vulnerable (Islam et. al., 2014a). In this case, the government took the responsibility to facilitate relocation of the flood victims and also support their livelihoods financially and by providing other livelihood options. However, the authors suggest that exposure to floods, sensitivity and lack of adaptive capacity determine the extent of livelihood vulnerability hence differ depending on the context in which

biophysical, socioeconomic and political factors interact (Ibid). Within the socio-economic factors, it is vital to note that different groups are affected differently, even though they are in the same community. The differentiated vulnerability in similar geographic locations suggests that factors that would enhance local adaptation can never be the same, they need to be differentiated depending on the needs and capacity of the vulnerable groups to cope with the floods and other effects of climate variability.

In the next section, I review three frameworks that present various factors which might enhance the adaptive capacity of the communities that are affected by disasters (including floods). I do so in order to understand how a multidisciplinary approach would be appropriate to reduce vulnerability to floods the disasters. The three frameworks are Local Capacity Adaptation Framework, Adaptive Capacity Wheel and Local Adaptive Capacity Framework.

2.4.1 Local Capacity Adaptation Frameworks

Adaptive capacity reflects how a particular system will be able to cope with climate variability (Engle, 2011). Adaptive capacity assessment determines how vulnerable a system is by mediating the exposure and sensitivity whereby the greater the adaptive capacity, the less vulnerable a system becomes to climate variability (Figure 1). This suggests that results from adaptive capacity assessments should ideally guide vulnerable communities and nations opportunities to identify areas of improvements that will enhance the adaptive capacity of the communities in order to reduce vulnerability to climate variability. The challenge however is that there are high uncertainties in climate issues which presents the complexity of climate variability issues. However, the adaptive capacity assessments are essential because they also help to identify local adaptation challenges that need external support by targeting the factors that exacerbates exposure and sensitivity to climate variability.

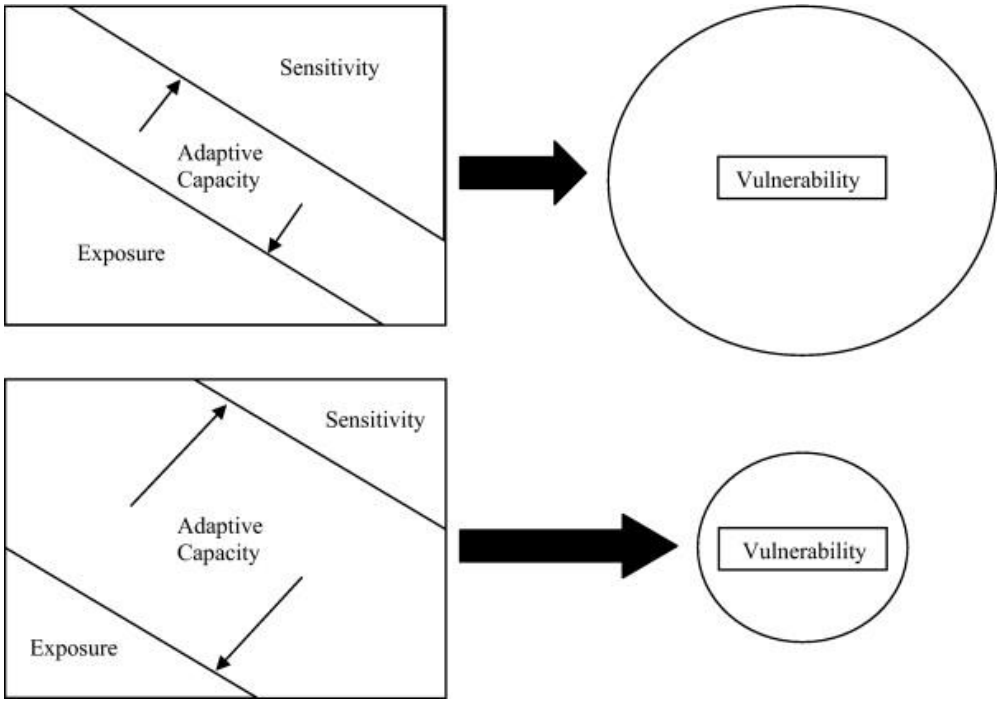


Figure 1 Adaptive Capacity's Role in Influencing Vulnerability

Figure 1 shows that nations, communities and households that have low adaptive capacity to cope with the negative effects of climate variability will be more vulnerable to the effects of climate variability because they are more sensitive and exposed to climate variability. On the other hand, if the adaptive capacity is enhanced, the nations, communities and households will be less vulnerable to the effects of climate variability because their sensitivity and exposure to climate variability will be reduced.

Source: Engle (2011) adaptive capacity and its assessment, Global Environment Change 21(2): p 650

However, Engle (2011) indicates that adaptive capacity of communities and nations is highly influenced by institutional management and governance styles. This indicates that the changes in the political and social factors would create changes in local adaptation capacity hence understood as dynamic in this way. Walker et al. (2006) highlight an important aspect that suggests that institutions at various levels can only assume what really happens in the disaster prone areas and how best they can help to reduce the burden of environmental changes on the affected people, whilst the people themselves, through experience, are capable of suggesting better interventions. However, Ostrom et al. (2007) emphasize that different systems function differently hence the operationalization of one system can never be used to generalise and predict how another system would be able to adapt. Ostrom et al. (2007) therefore suggests that different communities need to be studied within their

system to understand how the people interact with their environmental changes and that generalising findings would only result in interventions that are not applicable to the other communities and their environment. This also is a challenge in some programs that are being up-scaled without proper assessments to determine suitability of the programs in the new areas. This thesis therefore seeks to understand the context in which communities in the case studies are vulnerable to climate variability based on the adaptive capacity of the communities (Figure 1) which are totally different in many cases.

The differences in vulnerability to extreme weather events based on sensitivity, exposure and adaptive capacity indicate that there should be a variation in climate related policies and adaptation strategies. Furthermore, due to the variation of policies and implementation strategies, there are several adaptive capacity assessments that are conducted in order to inform policies and determine how prepared a system is to adapt to climate variability (Brooks and Adger 2005; Eakin and Luers, 2006; and World Bank, 2010). Institutions such as the United Nations Development Programme and several governments have carried out adaptive capacity assessment in various climate related programs which they implement to identify ways in which they can effectively implement adaptation programs (Ibid).

According to Gupta et al., (2010), the adaptive capacity wheel (Figure 2) is a qualitative tool that is used to assess the internal characteristics and status of institutions in order to enhance the capacity of a society to adapt to climate change and offer insight into recommendable changes that would enhance possible redesigning of the institutions to be able to adapt to various changes. Using the Adaptive Capacity wheel in Chile and Argentina, Hurlbert and Gupta (2016) found that in the global South, resources to effectively adapt to climate change are not adequate. The resources include technical, financial and general inefficiencies in governance (Ibid). This framework enables further understanding of various institutions and the relations within and amongst interested stakeholders which affect adaptation either positively or negatively. The authors of this framework suggest that it is important in understanding, enhancing and redesigning institutions from local through to national level so as to promote effective adaptation to climate change

(Ibid). In addition, using the adaptive capacity wheel, Hurlbert & Gupta, (2016) reveal that effective leadership at all levels is important for social learning and would consequently promote effective adaptation to climate change effects including, but not limited to floods, droughts and strong winds. Figure 2 illustrates that the adaptive capacity of a system depends on six critical factors which include the ability for the communities to learn, a variety of solutions to the problems the community faces, fair governance, adequate human, financial resources and authority on how the resources are used, good leadership at all levels and in various aspects and communities' room for autonomous change.

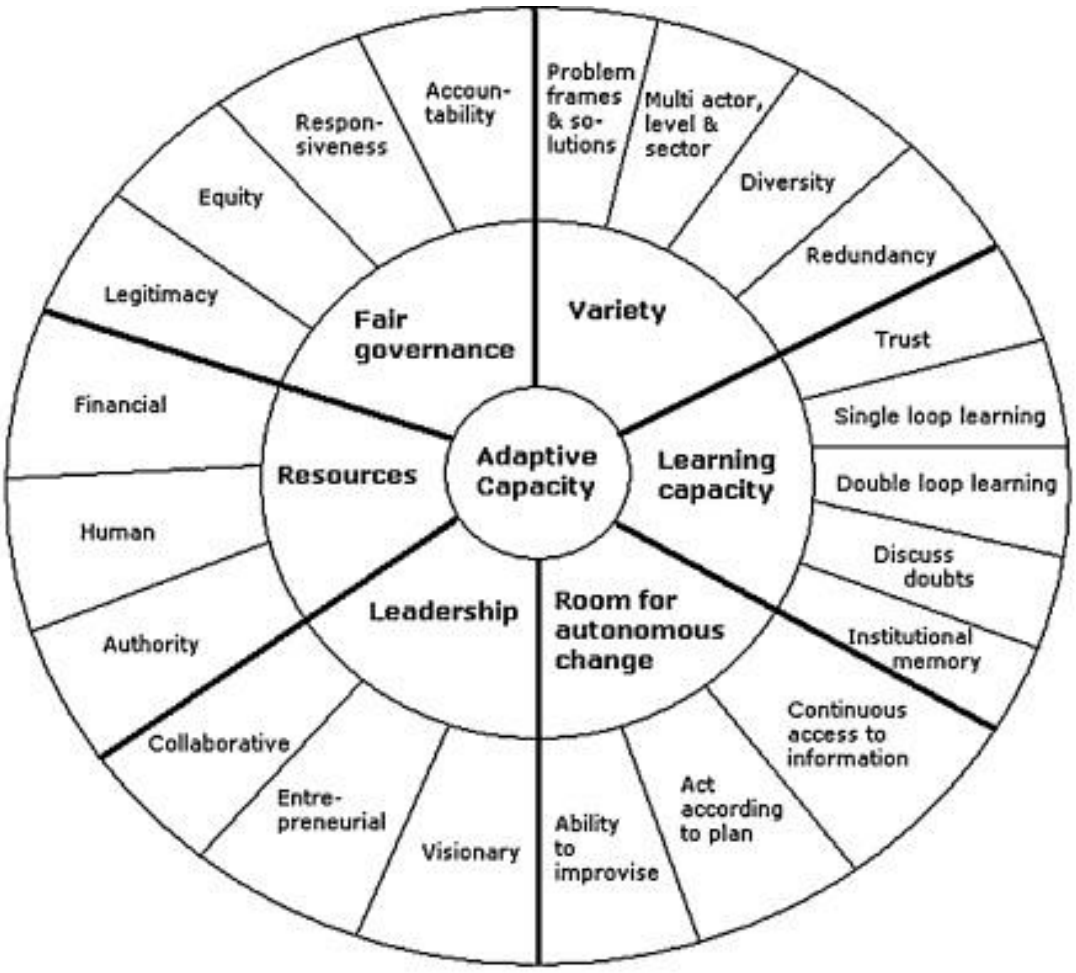


Figure 2 Adaptive Capacity Wheel by Gupta et al. (2010) P 464

Gupta et al. (2010) suggest that a society would be able to cope with the negative effects of climate variety if it is governed by institution that have effective leadership skills where they collaborate with other partners, are entrepreneurial and visionary to be able to lead the society. The authors also suggest that institutions should have room for autonomous change where they are ready to change in order to improve, they are able to act according to plan and are regularly looking for information that would enable them to perform better. The

institutions have the learning capacity where they are open to learn from their mistakes, share doubts and learn from each other based on various experience and exposure. The institutions should also have adequate financial and human resources as well as authority to regulate and enforce some norms that are important. In addition, there should be fair governance where issues of equity, legitimacy, responsiveness and accountability are addressed fairly. Additionally, there should be a variety to encourage diversity, effective solutions to existing challenges, multi-disciplinary approach to tackling society issues and to avoid redundancy in the way the societies are assisted.

Source: The Adaptive Capacity Wheel: A Method to Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society. *Environmental Science and Policy*, 13, 459 -471

Baudoin and Ziervogel (2017) indicate there is an adaptation fund at the global level with funding to assist local institutions to be able to implement adaptation programs. The challenge however is that the local institutions do not have adequate capacity to implement the projects which hinders the likelihood of accessing the funds (Ibid). This is another important aspect that needs to be addressed to effectively implement adaptation programs in developing countries. The need for assessments on the capacity of institutions at different levels to effectively implement climate change adaptation programs has been incorporated by practitioners in various institutions. It is important to assess the adaptive capacity of institutions at various levels in order to facilitate the efficient and effective use of climate change adaptation resources during implementation at different levels; failure to do this would result in huge amounts of money spent on projects that do not achieve the ultimate goal of resilience.

The Africa Climate Change Resilience Alliance (ACCRA) also developed an adaptive capacity framework called the Local Adaptive Capacity Framework (Figure 3, ACCRA, 2010). The Framework explores various factors it considers to be important in local adaptation. Firstly, the asset base; financial, physical, natural, social, political and human capitals which partly determines the capacity of a particular household and community to cope with floods and droughts. Secondly, institutions and entitlements available in the particular community which might ensure equitable access and entitlements to various assets within the community which also enables households within that community to be able to cope with the floods and droughts. Thirdly, flexibility and forward thinking decision making and governance which help

people to be willing to make informed decisions and take action towards reducing their vulnerability to floods and droughts. Fourthly, knowledge and information as another factor that enables the affected people to be aware of their risks and acquire various skills that they put into practice to cope with the floods and droughts. Finally, innovation as another factor that supports adaptive capacity and risk taking in order to reduce vulnerability. The assumption made is that households and communities with assets and those that perceive themselves not to be vulnerable, positive self-perceived vulnerability will utilise the assets they have within their setting, become innovative and hence come up with strategies that enable them to cope with the environmental changes in their context.

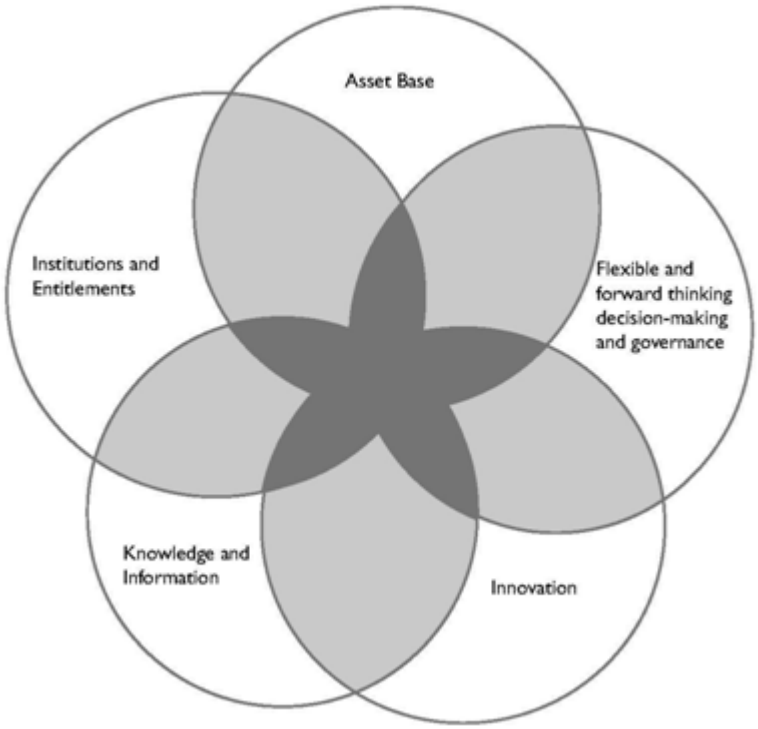


Figure 3 The Local Adaptive Capacity Framework (ACCRA, 2010)

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 climate variability. 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 climate variability. 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 climate variability (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. 5 Summary

This chapter has presented an exploration of vulnerability in terms of how current literature suggests that it is generated, who is affected, why they are affected and how adaptation can be designed in order to reduce vulnerability to climate variability. 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. In addition, it is clear that climate variability does not affect people equally, some groups of people are more vulnerable than others, mainly women, the poor and other marginalised groups. Furthermore, the review suggest that different communities have different adaptive capacity depending on various factors that also create their vulnerability, including but not limited to socio economical, biophysical and political factors.

The literature review indicates therefore that vulnerability and adaptive capacity should never be generalised because it is socially and spatially differentiated. It emphasises that there is a need to examine and understand different cases using political ecology approaches that pay particular attention to the context of vulnerability, livelihoods, gender, cultural norms and beliefs. This thesis uses Nsanje and Blantyre Rural Districts 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 two case studies. Apart from adding knowledge to the wider literature on 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: CASE STUDY

This chapter presents a definition of a case study design as a research approach. It also presents why the case study design was relevant for the self-perceived vulnerability and local adaptation research. The case studies for the research are mentioned and described based on the existing demographic data in order to highlight the context in which the research took place. The case studies were chosen based on the vulnerability of the areas to disastrous floods as well as my professional experience and knowledge of the floods in Malawi. I have worked as an Environmental District Officer for over 5 years and have worked in Nsanje and Blantyre Districts where I was involved in environmental, climate change and disaster related activities. The comparative analysis was important to enable me to understand the general processes of vulnerability, differentiate levels of vulnerability and the context within which smallholder farmers become more vulnerable. Also, to understand the context within which climate related decisions are made and implemented with a focus on opportunities and challenges to local adaptation in the flood prone areas. Mainly, I wanted to understand why some smallholder farmers continue to live in flood prone areas regardless of the fact that they have been asked by the government to relocate to safer areas and development activities have been withdrawn in the areas. In addition, I wanted to understand how these smallholder farmers living in areas that are affected differently by the floods perceive their vulnerability to floods and how they are coping with the environmental changes to sustain their livelihoods. I used the same research methods and approach in the two case studies to make certain that there is consistency in the design of the research.

3.1 Case Study Design

According to Crowe et al. (2011 p 2) case study design is defined as '*a research approach that is used to generate an in-depth understanding of a complex issue in its real-life. It is an established research design that is used extensively in a wide variety of disciplines, particularly in the social sciences….. it is referred to as a 'naturalistic' design in contrast to experimental design in which the investigator seeks to exert control over and manipulate the variables of interest'*. Sheikh et al. (2002) indicate that the case study approach is more appropriate for capturing information

that explains why events happen the way they happen, how they happen and what happens in a particular setting. In addition, case studies also help researchers to be critical by taking into consideration the social and political surroundings that has made a situation or event to be the way it is (Doolin, 1998). It deepens one's understanding holistically. It is with this understanding that this research used a case study design approach to understand why the smallholder farmers refuse to move upland, why they are motivated to continue living in the flood prone areas, how they cope with the floods and why they are still vulnerable after implementing climate change interventions for over a decade. Using the case study design, I was able to understand and relate my findings based on the social, political, cultural, economic and environmental context in which these smallholder farmers become vulnerable to floods and try to cope with the floods. The holistic nature of the design enabled me to deepen my understanding and relate the finding with relevant findings from other scholars that have conducted their studies in similar settings.

3.1.1 Multiple Case Studies Strategy

I collected data in flood prone areas in Nsanje and Blantyre districts. The main study case study was Nsanje district. During data collection in Nsanje, after the first three focus group discussions and five key informant interviews, the results indicated that flash floods that occur in Nsanje are partly as a result of environmental changes in other districts including Blantyre. In addition, these districts are along the same Shire River catchment where currently activities under the Shire River Basin Management Program is implemented (Government of Malawi, 2014). It is indicated that program activities are conducted in districts that are along the Shire River Catchment and are affected by floods and drought, even if it does not mention the extent of vulnerability (Ibid). Based on this, I decided to also conduct my research in Blantyre District to find out how different these areas are and how they differ in terms of vulnerability to floods and local adaptation. In addition, I sought to understand some of the findings that were obtained in Nsanje and were related to these areas. Therefore, I collected data in Traditional Authority, (TA) Kunthembwe, in Blantyre District (which is the Middle Shire River Catchment) in order to triangulate and understand deeply some of the information that was collected in Nsanje District. It was important in this case to have multiple case studies because it was relevant to associate some of the

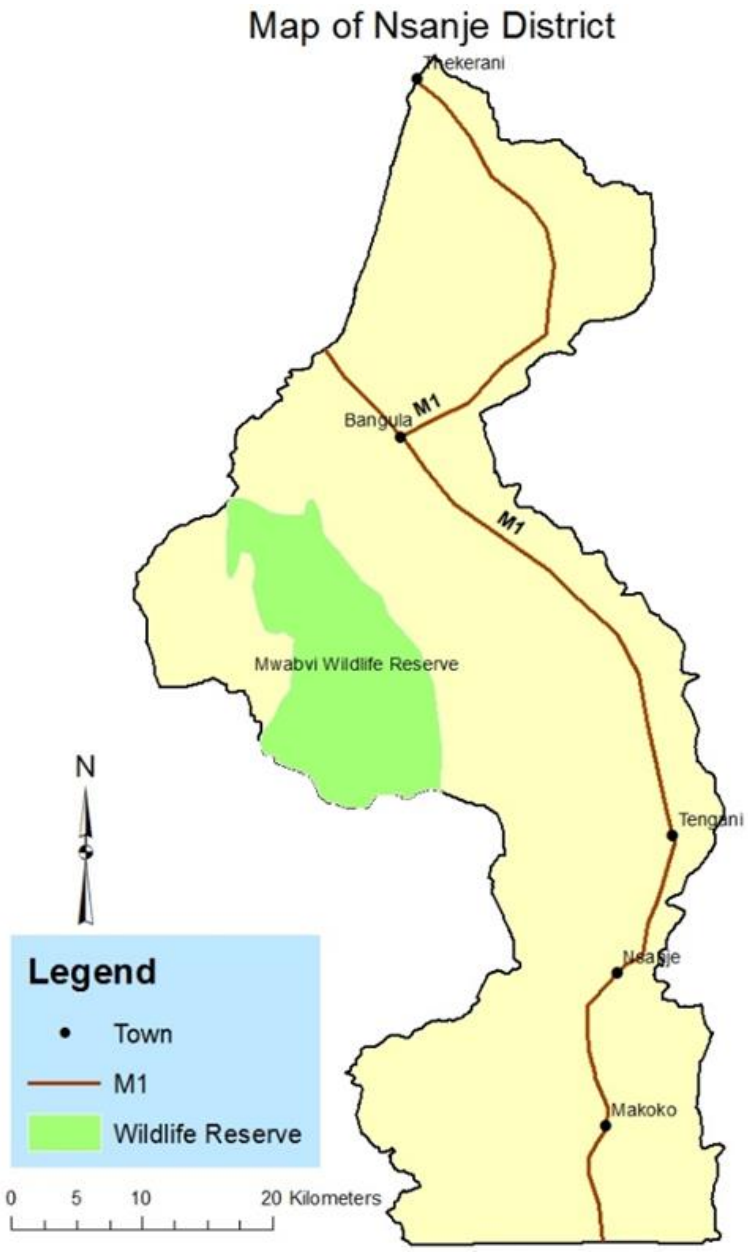
findings to enhance credibility and support dependability of the findings (Crowe et al., 2011). The information that was collected was compared and contrasted within and across the two case studies. The two case studies experience flooding at different magnitudes. They also differ in terms of geographical setting and cultural norms and beliefs.

I am mindful that the knowledge generated through this research can only be transferable and applicable in flood prone areas and can only be used in the context of which this research was designed for (Yin, 2009). In addition, by studying the research participants in their natural environment, my research addresses contextual settings which are very relevant for this type of research.

3.2 Case Study 1: Nsanje District

Nsanje is situated in the Southernmost of Malawi. It lies between 16°45'00" latitude and 35°10'0.02" longitude. It covers 1,642 square Kilometres and it is 241 Metres above sea levels. Nsanje shares boundaries with Chikhwawa District on the North East, Thyolo District on the North and shares a border with the Republic of Mozambique to the South, East and West (Map 3). Tourist sites include Mwabvi game reserve which lies along the North-Western part of the District and the Elephant Marsh which lies partly in the Northern part of the District. According to the Meteorological Department, (2015), the temperature ranges from 52°C (126°F) in November to around 8°C (46°F) in June, whilst the rainfall average is around 750millimetres (30inches) yearly from January to April, whilst floods usually occur in February in years they occur. Nsanje District is heavily affected by flash floods as a result of heavy rainfall in Thyolo, Mulanje, Neno, Mwanza and Chikhwawa Districts (DoDMA, 2012). The population is 238,103 people, living in approximately 52,000 households and the population density is 123 people per sq.km (National Stastics Office, 2008). In January 2015, a 20km- long cropland was destroyed in the east bank of the Shire River resulting into food shortage in the District.

Map 3 Nsanje District



Source:

https://www.google.com/maps/vt/data=Km1Qg6HLY2IKTi_XgyIYZM7ZrxUSEeSIAAs5kOZkVqa1pOMKy3iJKvr7yeWHLBmpm_6-VmAXL6LjCQj0nOxOp5o8KkltpAYyVl26sDR5KltpBm_8Z79vIeRGywAPeJ93AGxr8q6ySAhnzMHslwjGUH6iFzn20puqwR8kdseZHlB3re5rIN1PaJmhprWKjVQtcufA7TmmnbRlZWK6gucQwibEe2uQ3Q

3.2.1 Economy, Agriculture and Culture in Nsanje

Nsanje District is one of the poorest Districts in Malawi. According to the National Statistics Office (2008), 76% of the total population of Nsanje is poor with 44.3% out of the 76% living in absolute poverty. According to Nsanje District Council, (2009), the major income for the communities comes from the smallholder farming of various crops including Maize, millet, sorghum, rice, sweet potatoes, beans and cotton under mainly rain fed agriculture. Nsanje is surrounded by Ndindi, Chisamba and Makhanga Marshes where Maize and rice is grown. There are irrigation initiatives introduced by the Ministry of Agriculture and other development partners, including but not limited to Food and Agriculture Organisation, European Union, World Food Program, The World Bank and United Nations Development Program. Maize is the main crop that is grown under irrigation and post rainy season. Sweet potato is another crop that most smallholder farmers grow after the floods apart from the maize, whilst others grow concurrently with the maize. Fishing is the second economic activity after agriculture in Nsanje (Nsanje District Council, 2009).

The livestock that is reared is mainly cattle, goats, sheep and domesticated birds, such as guinea fowls, chicken and ducks amongst others. The accumulation of livestock such as cattle, goats and sheep is an indication of wealth and forms part of societal prestige (Nsanje District Council, 2009). Smallholder farmers with more livestock are deemed to be rich and are highly respected within the communities. The ultra-poor do not have any livestock and are usually targeted as priorities to benefit from relief aid, subsidy and other need based programs, during and after a disaster (DoDMA, 2012).

The programs that aim at enhancing the livelihoods of the ultra-poor are initiated coordinated and supported by the Government through the District Commissioner's Office. The development partners implement these projects through the office of the District Commissioner and are supported by the responsible government department in the district. For example, all the humanitarian activities being implemented by various donors through the Non-Governmental Organisations are coordinated by the office of the Disaster Management Affairs at District level and the District Commissioner is the controlling officer.

In terms of culture, Nsanje is a patrilineal society, where a woman generally moves to a man's home when they marry and all the children belong to the man. The most popular tribe is Sena, seconded by Mang'anja. The languages that are spoken include Chisena, Chimang'anja, Chichewa, English and Portuguese. There are traditional dances that are performed at different groups of people, Utse which is a women's dance, Madzuka, a traditional healer's dance and Ulimba, a dance performed at various occasions, including traditional meetings, weddings and after burial. There is a rain cult in Traditional Authority Ngabu in the south of Nsanje District (Nsanje District Council, 2009).

According to Nsanje District Council, (2009) there is a group of people that believe and worship a god called Mbona. It is believed that Mbona's head was cut several hundreds of years ago and the blood that came from him formed a river called Ndione. It is also believed that he returns to his wife's home every so often in the form of a python to tell people prophecies of the coming year. This visit of the Mbona is also related to the floods where some people believe that people experience disastrous floods or droughts when Mbona is angry with them for various reasons, including not visiting and offering sacrifices to him. There is a designated forest in Traditional Authority Ngabu where several people go to offer sacrifices to Mbona. When visiting Mbona, the people are advised to remove most of their clothes. Visitors are also allowed to visit the place where Mbona visits as long as they also remove most of their clothes. However, it is still not known why the people have to remove most of their clothes when vising Mbona, neither is it known how the actual communication is done between the Mbona and the people who offer the sacrifices when they visit him.

3.2.2 Health and Education in Nsanje

According to National Statistics Office, (2008) Nsanje has the highest fertility rate of 6.8, implying that on average, women give birth to approximately 7 children. It is expected that in 2030, the population will be approximately 418,051 people (Nsanje District Council, 2010b). Just over half of the population is literate, 52% according to NSO, (2008) with only 3.8% primary school completion rate. This indicates that even

though 52% of the population is able to read and write, the majority have not completed primary school. Due to the low literacy levels, it has been implied that people in Nsanje may struggle to adopt new skills and technology, and meaningful and objective climate change adaptation practices (Nsanje District Council, 2010b). The Council suggests that the majority of people will resist the needed adjustment in their farming practices and livelihood options as a result of climate variability and other environmental changes. As a result, adoption of environmental management and climate change adaptation initiatives will be slow and that the implementation of such development efforts would meet great resistance.

3.2.3 Environmental Management in Nsanje

Environmental degradation in Nsanje became significant in the late 1980s during the war in the neighbouring country Mozambique. Nsanje district hosted a large population of refugees from Mozambique who deforested huge areas as they temporarily settled in Nsanje as refugees (Nsanje District Council, 2009). It is also indicated that the establishment of a sugarcane plantation in traditional Authority Mbenje has exacerbated environmental degradation in Nsanje. However, the government of Malawi through various departments and NGOS such as Goal Malawi International, Cadecom, Foundation for Active Civic Education, (FACE), Malawi Red Cross, Action Aid International, Act Alliance through Church Action in Relief and Development (CARD), Total Land Care through the Wellness and Agriculture for Life Advancement project, and the United States Agency for International Development Office of Food for Peace (USAID/FFP) has been working in Nsanje to jointly reduce environmental degradation. According to the Nsanje District Development Plan (2010), the environmental projects are designed in such a way that they conserve the soil and water, enhance agricultural production and in a way, also improve the livelihood of the communities that participate in the programs.

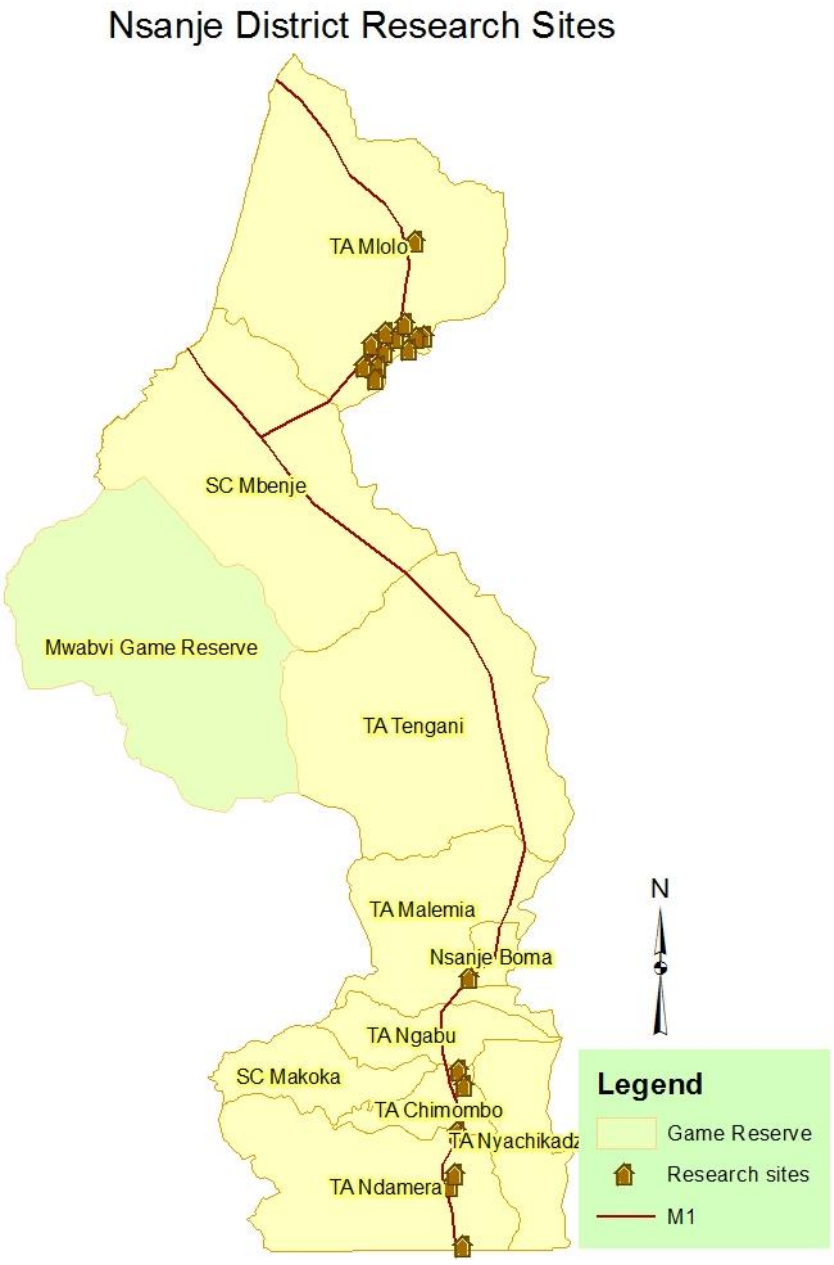
All the programs and projects in the district are accepted based on the district's development priorities, challenges and issues, even though to some extent, donor conditions shape the way projects are actually implemented. The donor conditions have resulted into programs being implemented the way donors want which is sometimes contrary to how it would be beneficial to the communities (Post-Disaster

National Meeting, 2015). This has in some cases, caused misunderstanding between the implementing organisations and the communities and has affected sustainability of such projects in the district. A good example is Conservation Agriculture which is championed by the government as a farming technology that is good for all but in some cases, the smallholder farmers have not benefited (Nsanje District Council, 2015a). Other scholars have also examined CA as a farming technology and found out that it has some challenges and is not suitable in all areas as will be discussed in chapters 6 and 7. As a result, some smallholder farmers have stopped practicing conservation agriculture after the donor project ended.

3.2.4 Research Sites

The research was conducted in the areas that have small brown houses, (Map 4) Traditional Authority Mlolo and Mbenje (top area) and Traditional Authority Nyachikadza and Ndamera in the (bottom part). The research sites were selected because they are usually affected by floods and communities in those areas migrate upland during floods and return after the floods. They have been migrating for over 5 decades and have developed local strategies that they use to cope with the floods. It is important to note that not every smallholder famer in the highlighted areas participated in the survey. Only a proportion of smallholder farmers and households were sampled and participated in this research, as detailed in the Methodology chapter.

Map 4 Nsanje District showing the research sites with small brown houses (Flooded areas)



Source: Map Action, Malawi flood event results of UNDAC Assessment of Nsanje District, 17th to 19th January, 2015.

Communities in the study sites are mainly Sena. They are mainly smallholder farmers who live in flood prone areas. They grow maize twice a year due to the moisture that exist in the flood prone areas whilst other smallholder farmers rely on irrigation for winter cropping. The areas are usually hot, sometimes temperatures

reach 40 Degrees Celsius. Floods do not occur every year and flooding in these areas does not occur simultaneously. In some years, some areas do not experience floods while other areas experience floods more than others therefore indicating that the frequency of floods is differentiated in the study sites. Communities in TAs Mlolo and Nyachikadza are more vulnerable to floods than the others. The whole of TA Nyachikadza is flooded during the flooding season whilst for TA Mlolo, nearby areas are not flooded, therefore some communities migrate to nearby villages within the same TA. For Communities in TA Nyachikadza, some migrate to TA Ndamera whilst others migrate to Mozambique. During drought, the smallholder farmers in the flood prone areas utilise the moisture to grow crops in their farmlands whilst others practice irrigation farming.

The areas are under the TAs, (The TA is the head of the Chiefs in the area). The areas are grouped in Group villages which are under Group Village Heads (GVHs). They are divided further in villages which are under Village Heads (VHs). The households therefore form a village, several villages form a group village and several group villages form a TA. Chiefs make the final community decision at various levels. At village level, it is the VH that makes the final decision. Depending on how big an issue becomes, if it cannot be handle by a VH, it is handled by the GVH. If the GVH fails to handle it, then the TA handles it. In terms of flooding and other disasters in the area, it is mainly the Chiefs that lead the people. In addition, Civil Protection Committees at various levels, village, area and district are actively involved in offering support during and after the floods mainly through coordination of evacuation process and handing out relief materials. The Members of Parliament and Councillors also assist people who are affected during and immediately after the floods by providing relief materials and helping to mobilise resources for the affected people.

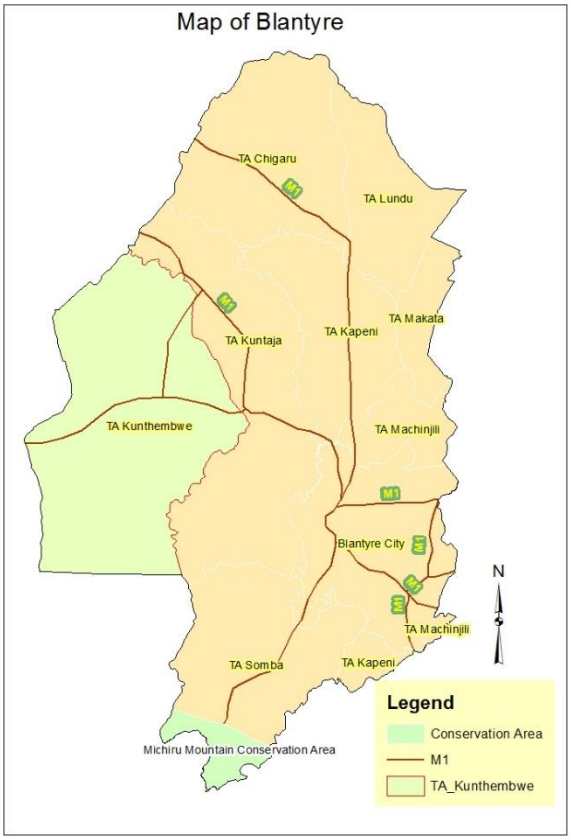
As indicated earlier on, these areas are mainly affected by flash floods as a result of heavy rainfall and environmental degradation in the upland districts. According to DoDMA (2015) these areas and many more areas closer to these areas will continue to be exposed to floods therefore suggesting that communities living in these areas will continue to be exposed to floods and the consequences of floods. This therefore

presents an ideal case to be studied in order to understand how the smallholder farmers themselves frame their vulnerability after experiencing floods several times and how they are coping with the floods. The fact that they continue to be vulnerable to floods after various efforts to reduce their vulnerability to floods also suggest that vulnerability and local adaptation issues are complex. In addition, flash floods affecting these areas more indicate how environmental degradation issues are transboundary with more disastrous effects in other areas than the areas where is occurs. This understanding motivated me to also study a different case in Blantyre Rural, which is amongst the areas that (Government of Malawi, 2014) exacerbates flash floods in the study areas in Nsanje due to environmental degradation.

3.3 Case Study 2: Blantyre Rural District

Blantyre District is situated in the Southern part of Malawi. It covers 2,012 sq.km and shares boundaries with Chiradzulu, Chikhwawa, Thyolo, Zomba, Mulanje, Neno Districts. It was named Blantyre by a Scottish Missionary explorer called Dr. David Livingstone who visited Malawi before independence (Blantyre District Council, 2012). My research was conducted in Traditional Authority Kunthembwe, highlighted in light green (Map 5) because it is an area which is along the Shire River and there are claims that environmental degradation in that area is partly exacerbating the occurrence of flash floods in the Lower Shire Valley, including Nsanje District (Nsanje District Council, 2009)

Map 5 Blantyre District: Traditional Authority Kunthembwe in Light Green



Source: Blantyre District Overview Map

https://www.google.com/maps/d/viewer?mid=1nG9_ENjaHe4sUM-JOJgGUerlwcE&hl=en_US

3.3.1 Economy, Culture and Belief in Blantyre Rural

Blantyre is one of the commercial cities in Malawi and is divided into two, Blantyre City and Blantyre Rural. According to NSO (2008), the population in Blantyre rural is 340,728 and it was estimated that in 2013, the population would be 557,234. In addition, the sex ratio is 93.6 and there are 80,879 households. The average household size is 4.2 and the population density is 190 people per sq.km (National Statistics Office, 2008).

The economy in Blantyre Rural District is diverse and includes companies as well as informal sector economic activity – which constitutes the vast majority of the

economy. Over 80% of the population is actively involved in smallholder farming whilst the rest earn their living through employment in Blantyre city, small businesses, fishing, charcoal burning and casual work (Blantyre District Council, 2012). The poverty level is at 46.5%, out of which 20.3% live in absolute poverty (National Statistics Office, 2008). According to the Blantyre District Council, (2014), maize is a major crop that is grown and other crops include beans, sweet potatoes, cowpeas vegetables, fruits, cotton and sun flower, amongst other crops grown. Livestock that is reared include cattle, goats, sheep, pigs and a variety of domesticated birds, including but not limited to chickens, guinea fowls, pigeons and quails.

In terms of culture, the Blantyre District Council (2012) indicate that the rural communities are a matrilineal society. This is where the man moves to a woman's home when they are married and settles there with all the children belonging to the woman. In most cases, the woman has more control over household resources and decision making. The common tribes are Mang'anjas, Lomwe, and Yao. The common language is Chimang'anja, Chilomwe, Chiyao, Chichewa and English.

3.3.2 Health and Education in Blantyre Rural

In Blantyre rural, the fertility rate is 5.4 births per woman, slightly lower than in Nsanje (National Statistics Office, 2008). This implies that on average, every woman has an average of 5 children in her household. In terms of education, 68% of the population is able to read and write and that 23.4% of the population have completed formal primary education. According to the data on education, there are also adult learning opportunities in the rural areas where many adults gather to learn how to read and write and hence the increase in the literacy levels over the years (Blantyre District Council, 2012). The literacy levels in Blantyre Rural are relatively higher as compared to many districts in Malawi, including Nsanje hence the assumption that the communities in Blantyre can easily understand and adopt climate change adaptation and development programs. It is also believed that they have access to more livelihood opportunities unlike most districts in the country hence in terms of survival, these communities could be slightly better off. Recently, Blantyre rural has been affected by floods which have made some households more vulnerable to floods and drought (DoDMA, 2012). Some communities have become worse off

economically due to losses they have incurred during the floods and have failed to fully recover after disasters (Blantyre District Council, 2014a).

3.3.3 Environmental Management in Blantyre Rural

Recently, Blantyre rural has become affected with floods as a result of heavy rainfall and hence has been receiving relief aid from the government and other development agencies (DoDMA, 2012). In Blantyre, charcoal burning has exacerbated deforestation. There is a high demand for charcoal and firewood in Blantyre city due to frequent power cuts (Blantyre District Council, 2012). Environmental degradation in the Shire River has affected the generation and distribution of electricity negatively hence the frequent blackouts in cities and all other areas where electricity is accessible in Malawi (Blantyre District Council, 2014). About 98% of hydro-electricity in Malawi is produced from the Shire River out of which the three dams are in the Middle Shire, Tedzani, Nkula A and Nkula B (Ibid). According the Blantyre District State of Environment and Outlook Report 2012, the frequent electricity power cuts has affected several other sectors of the environment and has contributed to flash floods in Nsanje and Chikhwawa Districts. There are also claims that the significant environmental degradation has indirectly exacerbated poverty levels in the district due to loss of household items and damages to infrastructure (Blantyre District Council, 2014).

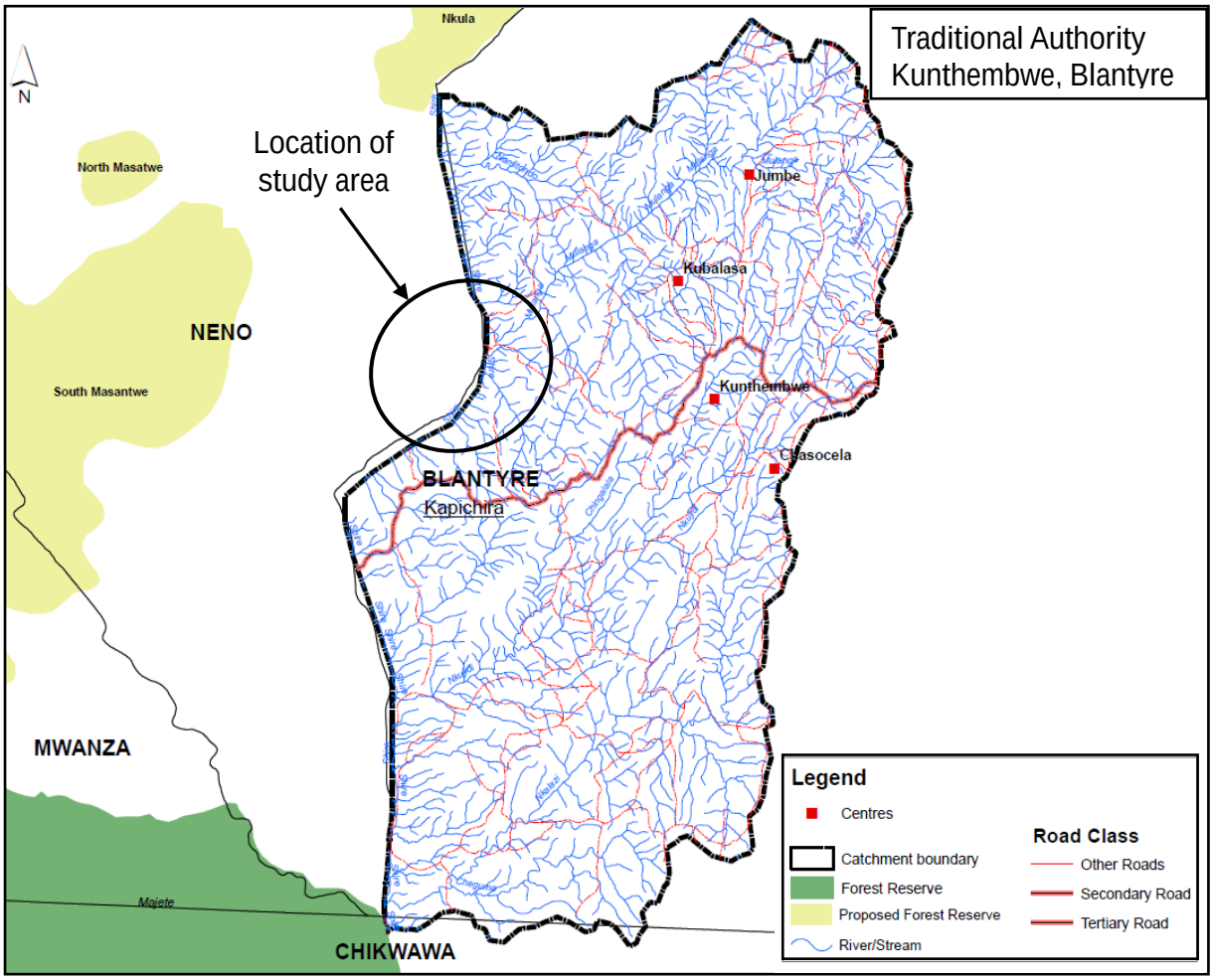
However, there are several environmental programs and projects that are targeting the rehabilitation of the Middle Shire River Catchment to address environmental degradation issues in Blantyre. For some projects, the aim is to minimise flash floods in Nsanje and Chikhwawa Districts through catchment management. These projects include the Sustainable Land Management (SLM) Program, funded by the United Nations Development Program (UNDP) and Global Environmental Facility (GEF) and The Community Vitalisation and Afforestation in the Middle Shire (COVAMS) funded by Japan International Cooperation Agency (JICA). In addition there are several government initiatives on reducing environmental degradation in Blantyre to enhance agricultural production and sustainable livelihood options. The implementation of the government projects is facilitated by government departments responsible for environment affairs, forestry, fisheries, lands and agriculture just to mention a few. There are also several NGOs which are implementing environmental and climate

change adaptation projects. These NGOs include but are not limited to Wildlife and Environmental Society of Malawi (WESM), Coordination Unit for the Rehabilitation of the Environment (CURE), Centre for Environmental Policy and Advocacy (CEPA) and the Malawi Environmental Endowment Trust (MEET).

3.3.4 Research Site

The next map (Map 6) shows where the research was conducted in Traditional Authority Kunthembwe. The area is usually hot with temperature reaching 38 Degrees Celsius in some days. The communities are mainly Mang'anjas.

Map 6 Research site in Traditional Authority Kunthembwe



Source: Obtained from the Shire River Basin Secretariat in Lilongwe, Malawi

The Mang'anjas are mainly smallholder farmers that have relied on rainfed agriculture until in 2013 when irrigation farming was introduced by the Shire River Basin Management Project. Due to frequent droughts, the communities have been burning charcoal and selling firewood as a source of livelihood. This has resulted in environmental degradation which has exacerbated the negative impact of heavy rainfall in the area and caused excessive flash floods in the Lower Shire Valley including Nsanje District (Government of Malawi, 2014). TA Kunthembwe is heavily affected by droughts unlike floods. In the recent years, from 2012, the area has been experiencing floods which have eroded top soils in the areas. In 2015, the communities lost their farmlands due to heavy rainfall which was reflected in the change of soil structure in some farmlands in Nsanje Districts.

In terms of governance structures at local level, the area is divided in Traditional Areas (TAs), which is then divided in group villages (GVs) that are further divided in villages (Vs). The operation of the chiefs at various levels is the same as in Nsanje District. In Blantyre Rural, just like in Nsanje, there are active Civil Protection Committees at various levels that coordinate disaster related activities. The District Commissioner, (DC) is the controller of all the issues at District level and the same applies to Nsanje District.

This case was important in the research to be able to differentiate the extent to which communities are exposed to floods and various ways in which communities are able to adapt to climate variability. Apart from the geographical position, these communities also differ in terms of culture and extent of exposure to floods.

3.4 Summary

The chapter started with a brief description of the case study research design. Then the two different case studies that were studied during the research were described based on their social, economic and cultural aspects. Both cases in Nsanje and Blantyre districts are along the Shire River catchment and are affected by both floods and droughts. However, the smallholder farmers in Nsanje are more vulnerable to the floods because of their geographical position and capacity to cope with the floods locally. Nsanje is in the Lower Shire Valley whilst Blantyre is in the Middle Shire also known as the Shire Highlands. Smallholder farmers in Blantyre District are affected by floods from heavy rainfall whilst smallholder farmers in Nsanje are affected by floods from both the heavy rainfall and flash floods as a result of heavy rainfall in the upper and Middle Shire River Catchment, including Blantyre. Previously, more climate change efforts were concentrated in Nsanje districts until around 2007 when catchment management was introduced to be able to tackle flooding in Nsanje, (SLM 2009). During the time that I was conducting the study, the study areas did not have specific secondary data on flooding. This research was therefore conducted at the right time because I was able to collect the specific data on flooding and temporary migration. The data that I collected in the study areas is also important because it

provides evidence of different levels and dynamics of vulnerability and complexities of local adaptation in the flood prone areas. The data can therefore be used to inform climate related policies and other climate related decisions at household, community, district and national level.

CHAPTER FOUR: METHODOLOGY

This chapter describes the research philosophy under which this research was undertaken and why it was important to use the social constructionist epistemology to understand how smallholder farmers perceive their vulnerability to floods and how they are coping with the floods. '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. Ethical considerations and study limitations are also highlighted to indicate the jurisdictions and boundaries within which this research was conducted, and within which its findings apply.

4. 1 Research Philosophy

This study was based on social constructionist epistemology, an understanding that individuals construct their own reality that can not be proven scientifically. Berger and Luckman (1967) challenges the fairness, practicality and reasonableness of scientific evidence based research with an understanding that social research can never be based on facts that can be proven always. This suggests that people view things differently based on their perspective of the issue under research, surrounding environment, culture, personal beliefs and myths.

Garden (2001) argues that there are certain beliefs, myths and realities that are embedded and hold true to various societies and have meaning to them but can never be proven by a scientific method. Such myths and beliefs need to be understood in contexts as a true phenomenon and very important in people's values and behaviours even though for positivist approaches, science is the only way of determining the truth of a phenomenon (Ibid). Furthermore, it has become evident that social constructionists are inclusive during their social research as they

recognise that people are unique and there are certain realities and truths that can only be applicable in a particular environment based on local experience and different perspectives (Gerdeb, 2001; Hacking 1999; Hibberd, 2005 and Parker, 1998). This reseach seeks to understand what motivates smallholder farmers to continue living in flood prone areas, how they perceive their vulnerability and how they are coping with the environmental changes in their environment, including floods. These issues can only be explained and understood by carefully engaging the experiences and knowledge of the smallholder farmers themselves living in the flood prone areas because they are the ones who have been interacting with the environment and understand natural behaviours in context to be able to make climate related decisions. These issues are socially constructed and embedded in the culture, social, political and environmental interactions within the particular setting.

4.1.1 Interpretivist Epistemology Approach

In this research, I used a case study approach to explain, describe and explore self-perceived vulnerability to floods and local adaptation in Nsanje District in Malawi, under an interpretivist [4] epistemology [5] 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) defines *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

[4] Interpretivist – An approach to social science that suggests that realities are socially constructed hence need to be understood and unpacked based on the context in which the realities have a meaning and hold true.

[5] Epistemology – Theory of knowledge especially with regard to its methods, validity, scope and the distinction between the justified belief and opinion

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 smallholder farmers living in flood prone areas perceive their vulnerability to floods. The social realities obtained enabled me to also understand how the smallholder farmers 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 smallholder farmers living in the flood prone areas without any preconceived beliefs and ideas that could have shaped the findings. During focus group discussions, the smallholder farmers indicated that some areas that were never affected previously by the floods have become exposed to floods over the years. The smallholder farmers explained how they used to know previously that they were going to experience floods, the beliefs they had, and how they have been monitoring the floods over the years. The smallholder farmers also explained the strategies that they have been implementing to adapt to the floods over the years, which included offering sacrifices and changing some behaviours.

Using similar concepts, Evely et al. (2008, p9) suggest transcendental realism best describes this philosophy, '*researchers gaining insights from feelings and emotions into what participants believe influences their motivation, providing both qualitative and quantitative data*'. It is further indicated that studies conducted using social constructionist approach are multi-disciplinary, hence holistic in nature (Ibid). This understanding guided me to use both qualitative and quantitative approaches of collecting information. These approaches helped me to obtain general information on what happes in the flood prone areas and to further understand what actually motivates the smallholder farmers to continue living in flood prone areas regardless of the associated flood risks. Also, to get insights of what it means to the smallholder farmers to be living in the flood prone areas so that I should deepen my

understanding on the human-environment interactions as a means of adaptation to the floods in flood prone areas.

Understanding the human-environment interactions is important because people live and interact with their environment based on their historical and social perspectives as per the social constructionist epistemology. In this research, I had an understanding that vulnerability to floods and local adaptation issues are multi-disciplinary in nature; therefore positivist approaches were not suitable. Social constructionism is capable of dealing with environmental change and leads to meaningful analyses that can be used for multi-disciplinary research (Jones, 2002). It is within these boundaries that I also used a political ecology approach [6] to understand how smallholder farmers living in flood prone areas perceive their vulnerability to floods and how they are coping with the floods.

In this research, therefore, it was assumed that the smallholder farmers have experience of dealing with the floods and droughts in their settings because they have been experiencing floods for a long time. Furthermore, my understanding was that the way the deal with the floods has been influenced by cultural factors, geographical positions and exposure to various adaptation skills, including flood management. In this research, the understanding was that the smallholder farmers have been coping with the floods and droughts over the years within their geographical positions influenced by self-perception to vulnerability to floods and droughts, culture and other beliefs in their communities. In addition, I was able to understand how some smallholder farmers choose to become innovative and cope with the environmental changes they are experiencing whilst others choose not to take action to reduce their vulnerability within the same cultural and geographical setting. Innovation in this research has been defined as a positive change in the way people live and an improvement in their living standards influenced by the environmental changes including environmental degradation, floods and droughts.

[6] Political Ecology Approach – Study of relationships between political, economic and social factors with environmental issues and changes. Political ecology politicises environmental issues and phenomena.

4.2 Sampling

The research areas for the study were sampled out of the whole community of smallholder farmers 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.

4.2.1 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 (Map 3)**.** 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.

The community mapping exercise was done in both Nsanje and Blantyre Districts. However in Blantyre, I only targeted Traditional Authority Kunthembwe in a specified area along the Shire River catchment. It was the only area which was linked with the flash floods in Nsanje District due to high deforestation rates and soil erosion causing excessive run-off along the Shire River basin (United Nations Development Program, 2009).

4.2.2 Study Site Sampling

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 smallholder farmers 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 smallholder farmer living in the 10 Group Village Headmen participated in the survey. Neither did all the smallholder famers 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.

4.2.3 Mixed Methods Sample size

In terms of sample size, (Table 3) this research involved 227 farming households during the household survey and 12 focus group discussions (FGDs) with smallholder farmers. 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 3 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 a 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.

4.3 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) and one community in TA Kunthembwe. Differences in geographical setting, power dynamics, culture, socio-economic and political factors were the main factors in assessing the differences in the self-perceptions to floods, droughts and climate variability, and innovative measures taken to reduce their vulnerability. 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 the smallholder farmers 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.

4.3.1 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 smallholder farmers 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.

4.3.1.1 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 farming 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 smallholder farmers 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 smallholder farmers have never experienced severe floods before January, 2015. The smallholder farmers 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, 2015, smallholder farmers 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 the smallholder perceive their vulnerability to floods and learn from them of initiatives they are taking to mitigate the effects and manage the flood risk. 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 farming 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.

4.3.1.2. 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 then facilitated a Participatory Wealth Ranking (PWR) exercise at traditional authority level where the people on the list were grouped according to their social status, whether they were better off, on average or worse off. PWR is a participatory research appraisal process that identifies poor households on the basis of criteria that is identified by the community themselves (Collins, 2009; Aryeetey et al., 2010; Hargreaves et al., 2007). PWR is a subjective and localised way of measuring poverty based on the participating community's perception of poverty (Aryeetey et al., 2010). PWR was suitable for my research to strengthen the applicability of observed issues. PWR helped me to further understand the meaning and implications of certain things that I observed in context, based on socio-economic, political and power dynamics within the social groups. The approach I used strengthens my methodological approach and research contributions using political ecology theory and social constructivist epistemology.

There are however two other objective ways of determining the poverty levels of the community that are based on set guidelines and principles. These include, firstly, the Means Testing (MT) that identifies poor households or individuals based on income or expenditure threshold (Coady and Parker, 2005) and secondly, Proxy Means Testing (PMT) that identifies poor households on the basis of criteria that relate to income accrued through education, (a case where eventually people become educated and get relatively good jobs where they earn good salaries) housing characteristics and asset ownership (Sherif, 2009). These above definitions are objective and can be confusing at local level based on the setting, hence I preferred not to use them in order to understand from the communities themselves how they define poverty and what it means to be better off in their context.

The households that were considered as worse off were those households that are relatively poor and fail to adapt to climate change effects, also termed as the most vulnerable in the community. The households that were considered as better off were households that were able to cope with the floods and droughts, were financially stable and had other alternative livelihood options for their survival. The average households were considered as households that even though they are not financially stable, but they can at least cope with the floods and droughts. The

perception of poverty by the community members was put in context of vulnerability where it was mainly based on households' responses to extreme events.

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.

4.3.1.3 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 summarised using measures of central tendency such as means, mode, median

and range. Categorical data was summarised 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.

4.3.2 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.

4.3.2.1 Key informant interviews

I personally conducted 57 KII with selected smallholder farmers 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 smallholder farmers 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.

4.3.2.1.1 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 smallholder farmers who could provide the information that I was looking for. The selection of the smallholder farmers was made based on the smallholder farmer's 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, smallholder farmers living in neighbouring villages to the research sites were also identified as playing a major role in local adaptation to floods. It was indicated that the smallholder farmers in the neighbouring 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 smallholder farmers 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 smallholder farmers.

4.3.2.2 Focus Group Discussions

A series of 12 focussed 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 smallholder farmers 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 smallholder farmers in 1 women-only focus group discussion in Nsanje and 11 smallholder farmers in the remaining 11 focus group discussions.

Figure 4: A Focus Group Discussion

The focus group discussions comprised of different groups of smallholder farmers to enable each group to be free to express their opinions. Also based on their experiences, gender and age, to be able to remind, agree or disagree with each other on some of the issues that were critical to perceived risks, vulnerability and local adaptation in their communities. 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.

4.3.2.2.1 Sampling Process

For the FGDs, a mixture of smallholder farmers in different social classes were identified through purposive sampling. Using small pieces of paper, names of the smallholder farmers living in the flood prone areas were written down. The small pieces were picked out of a box during a community meeting at the village headman's ground. Every village member was invited to attend the meeting even though not every member was present. The small pieces of papers with names were put in a basket and the smallholder farmers took turns to pick the pieces of paper. Those people whose numbers were picked were the ones that participated in the focus group discussions. Coincidentally, only 1 person participated in both the FGD and HH in Nsanje. 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 smallholder farmers' 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.

4.3.2.3 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).

Figure 5: Discussion with women who usually stay at the evacuation site

4.3.2.4 Data recording

I managed to record three key informant interviews successfully using a recorder, even though I was also writing down the responses in my notebook. Due to the timing within which the research was conducted, I sparingly used the recorder. As indicated earlier on, the data collection phase was disrupted with the floods that affected the research participants. Hence, there were many people in the areas, recording flood victims to use the information for their project proposals for relief and humanitarian aid. So, for the smallholder farmers to believe me that my research was to understand self-perceived vulnerability to floods and local adaptation, I was begged by the chiefs to be writing down responses and not recording them. Since I was a student, with experiencing of writing responses during research, I agreed to follow their request for ethical reasons. Since I was also writing the responses, the transcribing of the 3 recordings was made easier. I recorded, wrote down and transcribed the 3 interviews myself to make sure that everything was captured.

The interviews were conducted in Chichewa and recording was done in English for most words since as a researcher I found it easier to write the responses in English

than Chichewa and Sena. Even though I speak Chichewa, writing Chichewa words is more complicated than English words hence I opted to write the responses in simple English. However, for those words that were difficult to translate faster, I wrote them in Chichewa and translated later on, immediately after the discussions and interviews. Some of the responses remained in Chichewa language and were only translated during the write up. As a researcher, I have worked with various academics as a translator hence I have excellent translation and writing skills that enabled me to effectively collect and transcribe the data. This skills also facilitated the arrangement of the raw data as I was preparing for data entry.

4.3.2.5 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.

4.4 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers 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.

Thirdly, in Chapter 7, the data was explored in order to understand how the smallholder farmers have been coping with the floods, the types of adaptation interventions that are being implemented and proposed in the areas and how sustainable they are to facilitate resilience to floods and climate variability in the long term. This theme enabled me to adequately discuss issues that influence and in a way exacerbate vulnerability to climate variability in flood prone areas and how important it is to frame vulnerability to floods and climate variability in context in order to design and implement climate adaptation projects that enhance resilience to floods and climate variability. This section builds on literature on transformational adaptation (Pelling, 2010; Pelling et al., 2015) by illustrating that adaptation strategies should not be rigid and generalised, but rather, they should be flexible and specific to particular areas. This strategy would help to reduce the vulnerability of the communities that live in the areas the way by addressing specific challenges that hinder successful local adaptation to climate variability.

The next five chapters that follow therefore presents the findings and discussions on self-perceived vulnerability in Chapter 5, motivations to live in flood prone areas in Chapter 6, local adaptation strategies in the flood prone areas in Chapter 7, barriers and limitations to successful adaptation in flood prone areas, in Chapter 8 and the dynamics and complications of vulnerability and adaptation in flood prone areas, in Chapter 9. This thesis therefore illustrates that self-perceived vulnerability to floods is differentiated and that in some cases, insitu adaptation to floods is more viable than moving to safer areas. It further illustrates that context specific transformational adaptation is key to address specific barriers and limitations to local adaptation and that generalising adaptation strategies can sometimes create other vulnerabilities and exacerbate vulnerability to climate variability.

4.5 Positionality of Researcher and Research Assistants

Due to the nature of the work, I recruited four research assistants, two men; Gabriel Mlenga and Humphreys Magalasi, and two women; Twaile Kalagho and Palisha Mwanja to assist me in collecting the quantitative data. They are all graduates from the University of Malawi and have a vast experience in data collection through focus group discussions and household survey. I trained them for one week and involved them during pre-testing of the data collection tools, questionnaires and the checklist. It was helpful to use these research assistants because they had prior experience in data collection and were able to speak and understand the dialect, Sena language. Two other research assistants also helped me during the focus group discussions through observations and translations whenever necessary. Some participants could not understand some words in the national language, Chichewa hence needed translation to Sena which is their dialect. I, as a researcher understand Sena but do not fluently speak Sena hence the need for research assistants.

The research assistants were able to speak and understand Sena fluently even though they had never lived in the research areas and had no prior working experience in the area. We made sure that we humbly introduced ourselves as Malawians, though living in other parts of the country, Blantyre in this case. We also clarified that we were collecting data for an academic research that will lead into a production of the thesis, submitted to the University of Edinburgh in Edinburgh, Scotland, United Kingdom where I am pursuing a doctorate degree. Due to the

timing of the research, before and immediately after destructive floods, we disassociated ourselves from other researchers from non-governmental organisations; that were collecting data to write proposals to seek funding for relief items for the people who were affected by the floods.

Temple (2002) and Twyman et al. (1999) suggest that it is important to set the purpose of the research and positionality clearly in order to create an environment where researchers learn from the research participants in their contexts rather than being considered as superior and knowing everything much better than the participants. The research assistants presented their positionality to the research participants, that they do not have an idea of what happens in the area, also the researchers need to indicate their responses clearly as they were not aware of some behaviours and all the means of their cultural expressions. Therefore, the research participants responded freely and clearly during the survey and also made it easier during for translations of some words during both the key informant and focus group discussions.

In addition, recognising that I had worked as a civil servant at District level, the research participant were willing to participate in the research to help me achieve my academic goals. However, I was clear at the beginning of the research that I needed to have a deeper understanding of the context within which these communities are vulnerable to floods, how they perceive their vulnerability and how they are coping with the floods. Furthermore, I indicated that even though I worked in the areas as a civil servant, I lack deeper understanding of vulnerability and adaptation issues in the areas hence a need for them to respond as if they are responding to someone who has no idea of the area. Due to the clear positionality of the research assistants and myself, it created independence from the smallholder farmers' livelihood and experience thereby enhancing the validity and reliability of the information that was collected and translated during the data collection.

In addition to the four research assistants, I also consulted and involved Mr. John Madzifewe who is Nsanje District's data entry clerk for more information that was relevant for the research. Being the data entry clerk for the District, he was able to

direct us accordingly to the research sites and provided relevant contacts in the most affected areas. In addition, his office had most of the District Data such as number of affected villages and several climate change related interventions in the district that I also needed to understand what efforts are made to reduce the vulnerability of the flood victims and enable them to cope with the floods. The information obtained enabled me to adequately prepare for the fieldwork.

4.6 Pilot Study: Pre-testing Data Collection Tools

Before the actual fieldwork, a pilot study was conducted to test the household survey, interviews and focus group discussions to make certain that they were well understood to the research assistants and research participants. Also, to be certain that the meaning of the questions would not change when the research assistants were asking research participants during the household surveys. Pre-testing the data collection tools also helped me to adjust some of the questions, to make certain that they had a true reflection of the information that was required for the thesis. In addition, that they adequately answered the research questions. The whole process took about one month, after which then I was able to go to the field for actual data collection with the research assistants accordingly.

The data collection tools were tested in Chikhwawa District, which is a neighbouring district to both Blantyre and Nsanje (Map 7). The tools were used to ask questions to mainly smallholder farmers that were living in flood prone areas near Nchalo. I entered the data from the household survey on SPSS template that I had designed to make certain that the data that I will collect would be adequate. In addition, the process enabled me to adjust some questions and provided more response options to the closed questions based on the answers that were obtained during the pilot study.

For the interview and focus group discussions, I also tested data collection tools, just like the household survey. I collected the information and used NVIVO to group the responses and coded them based on the identified themes under mainly self-perceived vulnerability and local adaptation. In the process, I also added a few follow

up questions that enabled me to collect comprehensive data on perceived vulnerability to floods and local adaptation in the main study.

4.7 Ethical Considerations

Before the actual data collection, ethical research approval was firstly obtained from the Ethics and Integrity Committee of the University of Edinburgh. Secondly, I also applied for and obtained a research permit in Malawi from the National Research Council of Malawi and the Ministry of Environment and Climate Change Management. Thirdly, Permission and consent to undertake the research in the study sites was sought from the Blantyre and Nsanje District Councils through the District Commissioners and the District Executive Committee members before commencing with the research. A special research presentation was undertaken to brief the District Executive Committees of the two districts on what the research was all about and how the information will be used. Fourthly, consent was also sought from the Traditional Authorities, Group Village Headmen and Village Headmen with the help of the District Disaster Risk Management Officers. Fifthly, consent was obtained from the Area Development Committees, the Area and Village Civil Protection Committees and the Village Natural Resources Management Committees. These committees assisted me in identifying smallholder farmers that participated in key informant interviews. Finally, the research participants were only interviewed after their prior informed consent to take part in the research was obtained. Before the data collection process, I clarified my position as a student and emphasised that it was an academic research to which they had a freedom to either accept or decline to participate in the research.

During all the stages to obtain consent, confidentiality was emphasised and we assured the research participants that the study is for academic purposes. I also assured the participants that the information will not be made public without their consent and that during my analysis and report writing, there will be anonymity of the respondents. To avoid inadvertent disclosure of identities and creating suspicions, the specific villages were not disclosed during the actual data collection and in the thesis. However, to make sure that if need be, the research participants could be

traced, I recorded the names of the research participants and the traditional authorities that they are under.

The entire research team also signed a confidentiality agreement with me and assured the participants that they were not going to publicise the findings for any other purpose, apart from academic. After the study, a stakeholder debriefing meeting was carried out in each traditional village in order to share the main findings of the study with the interviewees as agreed at the beginning. The chiefs were pleased with us to share with them the preliminary findings so that they as research participants and flood victims should be aware of what will be written about them and have ownership to the collected data. In addition, they indicated that so many people from various organisations conduct their research and never brief them and hence they feel used. To minimise the risk of not being allowed to conduct more research in the future, I briefed them, to which they accepted ownership of the data that I collected by approving the study highlights that I presented; and released me to then use it for my academic purposes.

4.8 Study Limitations

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 smallholder farmers during the particular research period, and may not be true for the other times. This research therefore does not depict changes in smallholder farmer'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[7] in relation to some behaviours that are gender related, myths and beliefs in the case studies can be debatable.

4.9 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

[7] False Consciousness is a Marxist theory that people are unable to see things, especially exploitations, oppression and social relations, as they are. It is also referred to as any belief or view that prevents a person from being able to understand the true nature of a situation.

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 FIVE: FRAMING VULNERABILITY TO FLOODS BASED ON SELF-PERCEPTIONS TOWARDS FLOODS

5.1 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 smallholder farmers living in flood prone areas in Nsanje and Blantyre 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 smallholder farmers being more vulnerable to the floods than others, including low socio-economic status, lack of social networks and inability to cope with the floods. Additionally, it presents wider public's perceptions of the vulnerability of the smallholder farmers who live in flood prone areas. A summary section concludes the chapter.

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 smallholder farmers 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.

Smallholder farmers 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 the smallholder farmers 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 smallholder farmers 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. The responses from the smallholder farmers 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 smallholder farmers 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.

5.2 Public Discourse towards Smallholder Farmers that Live in Flood Prone Areas

Interviews with key stakeholders, including government officials, journalists, officials working in related organisations and some smallholder farmers living in upland communities indicated that the smallholder farmers living in flood prone areas are stubborn and enjoy receiving humanitarian aid and support during the floods. '*The smallholder farmers 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, 2015). 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 2010 and we remind them every now again, they are very stubborn'* (KII # 53, Nsanje, June 2015). However, another key informant indicated that '*to be honest, no one understands these smallholder farmers, 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 smallholder farmers 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 smallholder farmers 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.

With regards the media, one journalist during an interviewee clarified that '*we report what we hear from the government officials and other stakeholders, our duty is to publicise the initiatives that the government is putting in place for the smallholder farmers that live in the flood prone areas. As journalists, we go there and ask the smallholder farmers about the flood experience and what they need so that we report. We do not find out why these people live in the flood prone areas. People are interested to know their experiences and do not have time to be understanding why they live there*' (KII #55, June, 2015). The media perspective indicates a critical issue in communication, and reveals that communicating vulnerability and livelihood issues

in flood prone areas is not offered according to the realities of vulnerabilities, based on both opportunities and challenges. The focus is mainly on government interventions and humanitarian need in the flood prone areas.

A practitioner, who works as a social scientist in an international organisation indicated that '*due to the nature of my job, I am not allowed to interact with journalists. This in a way is very bad because as social scientists, we have interesting findings on vulnerability and local adaptation that we would like the public to know and understand, but we are not given an opportunity to do so. As a result, some journalists interpret issues in their own way and we have no chance to correct them*' (KII#56, June, 2015). This quote reflects a gap in communication between the social scientists and the media where the professionals and practitioners do not interact adequately with the journalists to make the livelihood issues in flood prone areas newsworthy and of interest to all stakeholders. Social media is important and critical to get the required attention from the government and the general public to support existing local adaptation strategies that have been proven to be helpful to the local communities themselves. Media could play an important role in flood prone areas by making certain that the government, the public and various institutions are aware and understand that vulnerability issues are complex and therefore demand a more comprehensive approach to support the livelihood of the communities.

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, 2015). In addition, another official indicated that '*our organisation has been on the government's side, advising the*

smallholder farmers 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, 2015). 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 smallholder farmers 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 are motivated to live in the flood prone areas. The lack of knowledge on the smallholder farmer's perspectives has created a general misconception of the livelihood of these smallholder farmers.

One smallholder farmer 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, 2017). These words accentuate the point that there is a meaningful gap in knowledge of perceptions towards vulnerability between the smallholders 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 smallholder farmers from the flood prone areas, the smallholder farmers themselves indicate that they are comfortable

in the flood prone areas based on reasons that are valid to them (as explored fully in chapter 6).

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 smallholder farmers 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. The smallholder farmers 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.

5.3 Self-Perceived Vulnerability to Floods

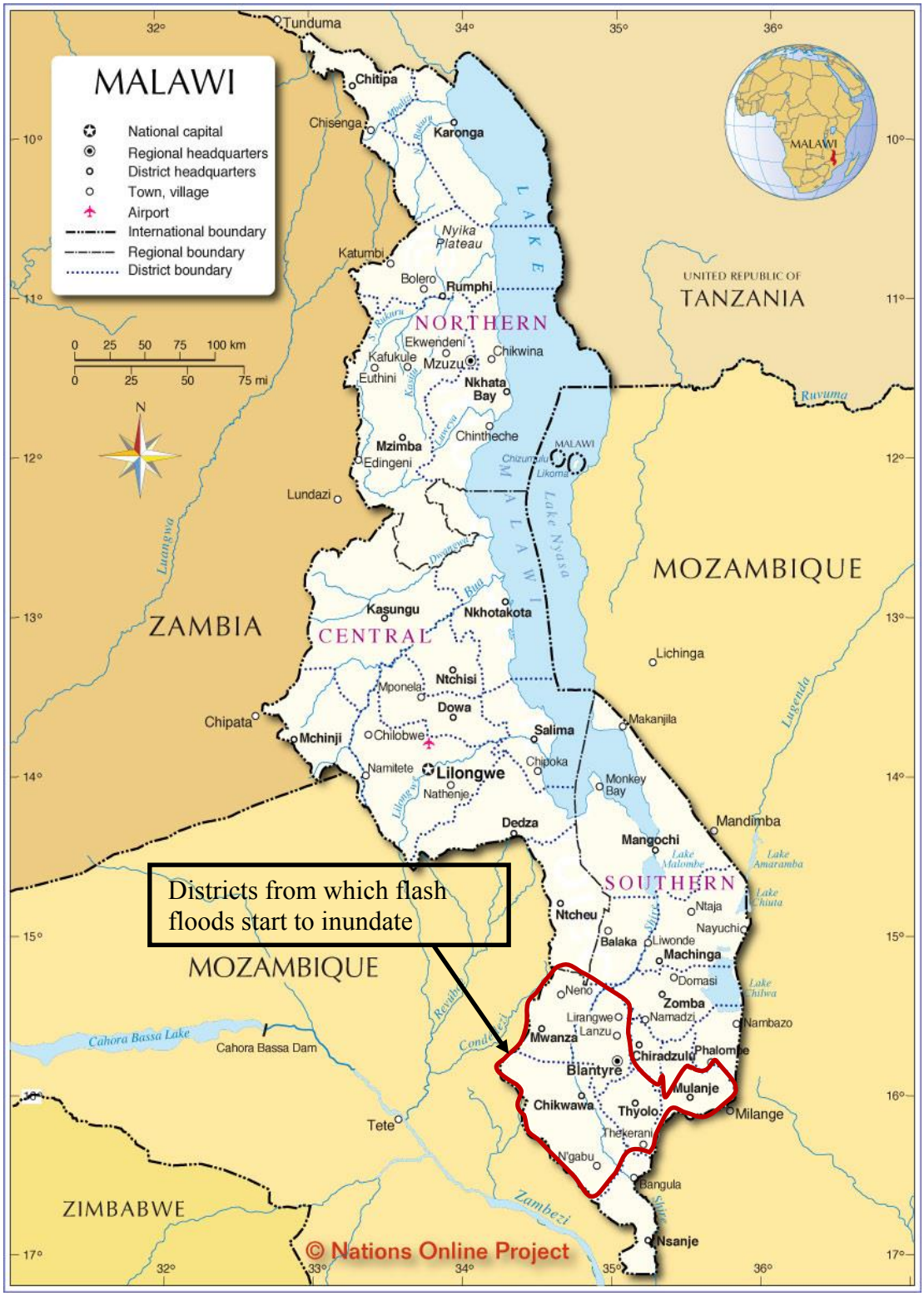
According to smallholder farmers who live in flood prone areas, their perspective of the floods is influenced by the location where they live, their personal interaction with the floods, age, the timing and severity of the floods, loss of life, emotions and gender. The next sections expand on these factors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

5.3.1 Self-Perceived Vulnerability to Floods by Location

Some smallholder farmers 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. The smallholder farmers in Nsanje are more vulnerable to floods than the smallholder farmers living in Blantyre. '*For us in Blantyre, we are better off because 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 Blantyre were aware that smallholder farmers 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 smallholder farmers in Nsanje*' (KII #51, TA Kunthembwe). Clearly, the difference in location between the two districts puts some smallholder farmers at more severe risk to floods than others. According to the Nsanje District Council (2010), the district is exposed to floods from the heavy rainfall and flash floods from district in the middle catchment, including Mwanza, Neno, Blantyre, Mulanje and Thyolo, in addition to one of the districts in the lower Shire Catchment, Chikhwawa (Map 7).

Map 7 Districts and neighbouring countries of Malawi. Specifically illustrating the position of Nsanje and other districts where the floods originate from



Source: Nations Online

Accessed at: http://www.nationsonline.org/oneworld/map/malawi-administrative-map.htm

In Nsanje, during household survey, key informant interviews and focus group discussions, the smallholder farmers 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 smallholder farmers 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 smallholder farmer, 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 smallholder farmers in Nsanje to be more vulnerable to floods than in Blantyre. This relationship is also evident in both Nsanje and Blantyre districts' socio-economic profiles and district development plans, and national project documents on catchment conservation and management.

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 smallholder farmers 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. In Malawi, where my study was conducted, communities in Nsanje and Blantyre are affected differently based on their different spatial locations, (Map 7) which by default, determine the levels of vulnerability to heavy rainfall. Furthermore, the case studies illustrate that some communities are continuously being exposed and are more vulnerable to flood despite all the efforts to reduce the impacts of those floods. 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.

In Blantyre Rural District, one woman indicated that '*over the years, we never thought we could experience disastrous floods as we have experienced this year, in January, 2015. Previously, we used to lose some of the top soils on our farm land, but now, we have completely lost all the top soils, our farmland as we speak are just rocks, we do not know where we are going to grow our crops. This is the first time we have been severely affected by the floods. Usually, we are affected by droughts*', (FGD # 12, TA Kunthembwe). During the household survey and focus group discussions, all the research participants also indicated that for the very first time, they have been heavily affected by the floods, in the previous years they had been affected by droughts. In addition, another man who before the January 2015 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, 2015 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 2015, 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 two case studies clearly indicates another aspect of vulnerability whereby smallholder farmers 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.

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

The findings illustrate the way that smallholder farmers 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 smallholder farmers 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 2015 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 smallholder farmer 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers' 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 smallholder farmers 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 smallholder farmers 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. Each area in Nsanje district is different in terms of exposure to floods and vulnerability context (Map 3).

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 and Blantyre Districts 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 smallholder farmers 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 smallholder farmers and poor smallholder farmers are disturbed and become more vulnerable unlike the perceived rich smallholder farmers 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 smallholder farmers that live in flood prone areas, it was clear that the some smallholder farmers 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 smallholder farmers 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.

5.3.3 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, smallholder farmers 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 smallholder farmer 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 self-perceived 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 smallholder farmers 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 smallholder farmers 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 (in TA Kunthembwe in Blantyre) which leaves the smallholder farmers with no land suitable for farming. The results hereby suggest that some smallholder farmers 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 smallholder farmers 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 the smallholder farmers perceive their vulnerability to floods as discussed next.

5.3.4 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 smallholder farmer 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, 2015). The smallholder farmers realise that living in the flood prone areas is dangerous after losing their loved ones. This statement suggest 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 smallholder farmers, 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 the smallholder farmers 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 smallholder farmers living in Nsanje, if it were not for the disastrous floods that caused death, all the smallholder farmers 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, 2015). 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 smallholder farmers 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, smallholder farmers 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 smallholder farmers realise 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.

5.4 Summary

In summary, according to material presented here, and based on the quotes on self-perceived vulnerability, the findings indicate that self-perceived vulnerability partly influences how communities frame their vulnerability to floods amongst themselves and to the public. In addition, the results illustrate that self-perceived vulnerability (and hence the framing of vulnerability) is differentiated amongst the affected communities based on gender, age and personal experience with the floods, in relation to the severity of the floods, loss and damage of assets, and loss of life. There are also several physical factors that mediate the differences in self-perceived vulnerability which include, the actual spatial location of the communities under study, exposure of the areas under study hence the communities themselves to floods, extent of vulnerability to the floods based on age and gender, number of years that the smallholder farmers have been experiencing worst floods, and frequency of

flooding. The results therefore emphasise the importance of contextualising vulnerability issues in order to help the planning, design and implementation of local adaptation strategies. The specific geographical position of the flood prone areas determines the exposure and risk to floods and the extent of vulnerability to floods, which then determine how smallholder farmers perceive their vulnerability to floods.

However, in terms of experience with regards to flooding and self-perceived vulnerability, the results indicate that experience influences self-perceived vulnerability to floods in addition to other factors, and that it is different from the public that does not experience floods. This is in contrast to part of the results that were obtained in the United kingdom, where statistically, there was no difference in terms of perception towards vulnerability to floods between communities that experience the floods and those that do not experience the floods (Demski et al., 2017). The difference in the findings, apart from different setting, was also caused by the different methods that were used in obtaining data. In this research, I used both quantitative and qualitative data collection methods which enabled me to probe deeper in the responses regarding perceived vulnerability between those that are affected by the floods and those that are not affected by the floods. However, in both cases, these studies indicate that those that experience flooding are involved in climate change adaptation and mitigation activities, both at household and community level. An interaction between the physical, economic, political and social factors and processes in which the smallholder farmers experienced the floods therefore shape their self-perceived vulnerability and how they frame their vulnerability to floods. In addition, the results illustrate that the smallholder farmers' self-perception towards vulnerability to floods has partly motivated some smallholder farmers to continue living in the flood prone areas regardless of the associated risks. Some smallholder farmers frame exposure to floods as part of their livelihood hence do not see the urgency to relocate to upland areas that are not exposed to floods.

This analysis is important because it presents a significant discrepancy between self-perceptions towards vulnerability to floods and public perceptions. Some scholars have studied perceptions on various actors, including governments, politicians and other organisations on communities that live in flood prone areas and little has been

said on self-perceptions. Ransan-Cooper et al. (2015) provide an important summary of such perceptions with no mention of self-perceptions therefore indicating that in their review on framing vulnerabilities, either little or nothing was written on such. Therefore this thesis provides another important aspect perceptions that should inform disaster and climate related policies. This thesis further illustrates that vulnerability is dynamic and complex with various processes and factors shaping and defining vulnerability in context (Dilling et al., 2015). Apart from the smallholder farmers being attached to their environment (including its flooding), there are several other factors that motivate the smallholder farmers to continue living in flood prone areas, as will be discussed in the next chapter.

CHAPTER SIX: MOTIVATIONS TO LIVE IN FLOOD PRONE AREAS

6.1 Introduction

This chapter presents a case study that draws on aspects of emotional political ecology. It focuses on factors that motivate smallholder farmers to continue living in flood prone areas. The factors include smallholder farmers' 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers insist on living in flood prone areas despite all the associated risks. This chapter presents that the factors and processes that motivate the smallholder farmers 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. The smallholder farmers 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 the smallholder farmers 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 smallholder farmers 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.

6.2 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 smallholder farmers weigh the problems they experience in their daily lives. According to the household survey, 83.3% of the smallholder farmers living in flood prone areas indicated that they perceived hunger as their main household problem when responding to an open ended question, asking smallholder farmers what they perceive as their main problem (Figure 6). 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 smallholders are exposed and vulnerable to floods, the floods are not the major concern in their lives.

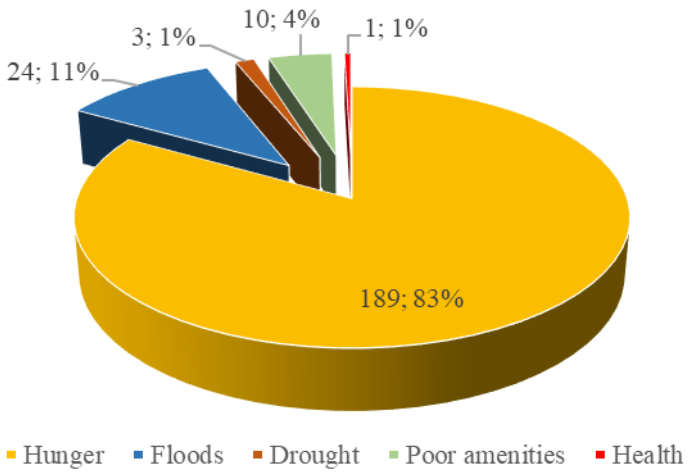


Figure 6: A Response during Household Survey on What Households Perceive as their Most Significant Problem (n = 227)

During FGDs and KIIs, smallholder farmers 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, 2015). In another interview, another farmer 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, 2015). 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 smallholder farmers are living in flood prone area. This chapter

exemplifies that in rural areas too, smallholder farmers 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 smallholder farmers would not be an appropriate solution, as many farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers have inadequate capacity to recover hence relocating them would worsen their situation. Tahira and Kawasaki (2017) argue that the poor smallholder farmers 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 farmers to establish themselves in the new areas. In the absence of these, these farmers 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 smallholder farmers 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

smallholder farmers clearly illustrate that they have devised ways of coping with the floods which also forms part of their motivation.

6.3 Droughts more important than floods

One poor farmer expressed that '*I have lived in this land since birth, even though I do not grow enough crops to sustain me the whole year, I survive on fruits like paw paws and bananas'* (KII # 2, TA Ndamera, February, 2015). In contrast, a middle class farmer in TA Nyachikadza said that '*my ancestors had a very huge piece of land, more than 10 acres. I only use a small portion because I do not have the resources to use the whole land. During droughts, I make more money because I let out the other piece of land to several farmers that pay me in cash or sometime give me bags of maize as form of payment. Actually, there is also some piece of land that remains unused. That way, I am able to survive'* (KII #18, TA Nyachikadza, April, 2015). From the group in which the farmers were perceived by the local communities to be better off economically and in terms of social status, one smallholder farmer explained that '*I live both in the flood prone areas as well as upland. I have managed to build a permanent home upland and have a temporary home in the flood prone areas. I cannot move upland permanently because of drought. We are experiencing more years of droughts than floods so living in the flood prone areas enables me to have adequate food throughout the year, regardless of whether there is drought or flood.'* (KII #27, TA Mlolo, June, 2015). It is therefore evident that smallholder farmers living in flood prone areas reduce their vulnerability to climate variability by diversifying their livelihood.

The statements clearly demonstrate that the most important aspect of living in flood prone areas for the smallholder farmers is that they are able to grow sufficient food for their families. Regardless of their socio-economic status, the smallholders indicated that they are more likely to continue living in the flood prone areas than to move upland. This therefore presents an interesting finding that suggests that the decision to continue living in flood prone areas is complex and there are other factors and processes that are considered apart from the risk itself. Apart from inheriting the land from their ancestors, these farmers also earn a living through letting out their farm land to smallholder farmers living in upland areas that are more vulnerable to

droughts. During the focus group discussions, the smallholder farmers indicated that *'we are more vulnerable to floods than droughts. Droughts do not heavily affect us because we have adequate moisture for our crops all the time. It is mostly communities that live in upland that suffer during droughts*' (FGD #5, TA Mbenje, May, 2015). The smallholder farmers are knowledgeable on climate trends in their respective areas and have strategized on ways to cope with the extreme weather events and droughts. In addition, the smallholder farmers indicated that they use local knowledge to predict the extreme weather changes which has enabled them to cope with the floods and droughts over the years as will be discussed in the next section.

6.4 Local Knowledge and Water Level Monitoring

The smallholder farmers 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. Smallholder farmers 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, 2015). Smallholder farmers have designed their own ways of understanding the extreme weather events, ranging from beliefs and myths of the *Mbona* [8] to innovative ways of flood monitoring using sticks. Based on these experiences, the smallholder farmers 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 smallholder farmers 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, smallholder farmers 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, 2015). 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.

[8] Mbona is a god that some of the people in Nsanje worship.

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 2015, 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 smallholder farmers 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 2015 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.

6.5 Politics and Power in Living with Floods

Smallholder farmers living in the flood prone areas are influenced by politics that guide the decision making process to either move or remain in the flood prone areas. For example, a smallholder farmer indicated that '*The decision to move upland lies in the hand of the chief. If the chief tells us to move upland, we will move, otherwise, we cannot disobey the chief*' (KII # 11, TA Nyachikadza, March, 2015). In addition one of the chief said that '*I cannot move upland because I will lose my chieftaincy. I have boundaries of influence, if I am to move with my people upland, we will have to be under the chief whose area we will settle. I do not think any chief would like to share his authority with me hence I would rather stay here with my people and still remain their chief*' (KII #8, TA Ndamera, March, 2015). The political nature and power dynamic within all the villages and communities suggest that the decision to move relies on the willingness of the chief to move. In these communities, chiefs have more power and control over the people at community level hence no one in the flood prone areas can decide to move upland without getting approval from the chief. '*We respect our chiefs so much, we relate with them like our fathers and mothers, hence moving on our own would show disrespect'* (FGD #8, TA Mlolo, May, 2015). This illustrates how key chiefs are in the Early Warning System to ensure that vulnerability is reduced and coping strategies are owned by the communities.

This reveals another level of power dynamics and social injustice where even though other households would have wanted to move, they are unable to do so because the people who have power to make decisions are not willing to sacrifice their positions and relocate to the upland areas. This is a unique finding in terms of power and leadership dynamics at local level in terms of critical climate related decision making. It illustrates that political dynamics at the local level have potential to either reduce or exacerbate vulnerability to floods in the flood prone areas therefore should be critically analysed and incorporated in adaptation policies.

A chief indicated that '*I would have moved upland if the government had paid compensation costs for us. How do they tell us to move and yet they have not paid any compensation? We do not have money to settle the compensation costs, that is why we continue living in the flood prone area'* (FGD #4, TA Mbenje, May, 2015). During a key informant interview a government official emphasised that '*the relocation process is very important, however the government indicated that there is no money for compensation for the land hence relocation issue has been raised and no one is willing to take up responsibility to facilitate the process* (KII #1, District Council). One village headman also indicated that 'the *government is insisting that we should leave without fulfilling its obligations, this is a political move to threaten us' (K*II #10, March, 2015). The results indicate that the costs and economics of relocation is preventing people from moving to upland areas. In addition, the suggestion that the communities should move without government support is perceived as a political move to some smallholder farmers.

The political nature of relocation in Namibia was assessed within the colonial era context where due to colonialism, communities in flood prone areas were forced to relocate to fulfil the wish of the colonialists (Likuwa, 2016). This suggests that the government should not use power to threaten communities to move but rather that such governments should facilitate the relocation process and provide adequate support in the designated areas (ibid). Lack of adequate relocation support from the government has 'partly' motivated the smallholder farmers to continue living in the flood prone areas, who subsequently become viewed by the government and other outsiders as refusing to relocate. An elderly lady said '*I could have moved to the new area if the government gave us money and everything we would need to start a new life there. I am old, I am weak so living in the flood prone areas is not good for me, I suffered during the last floods, I do not want to experience that again*' (KII #4, TA Ndamera). The results suggests that in circumstances where the compensation costs are paid and social amenities are supplied in the designated relocation area, some smallholder farmers are willing to relocate and only farm in the flood prone areas thereby minimising the impacts of floods on the smallholder farmers. During flooding, the smallholder farmers usually relocate to upland areas where they have established social networks over the years. This suggests that if they had permanent

homes upland, they would be living in their upland homes during the floods and live in the flood prone areas during droughts and the rest of the seasons. The social networks that have been established with upland communities also play a special role in decision making of whether to relocate or not as will be discussed in the next section.

6.6 Social and Cultural Factors in Living with Floods

During the household survey, almost 80% of the smallholder farmers indicated that they have a good social networks with smallholders 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 2015). Another farmer 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, 2015). Another smallholder farmer living in upland area indicated that '*We have a good relationship with the smallholder farmers 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, 2015). The social networks and the relationships between the smallholder farmers living in the flood prone areas and the smallholder farmers 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. Smallholder farmers 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 smallholder farmers are less vulnerable to climate variability in the flood prone areas. The smallholder farmers are therefore better off living in the flood prone areas than in upland areas due to droughts and limited space.

In some cases, some smallholder farmers 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 smallholder farmers living in the flood prone areas contrary to what was indicated by the smallholder farmers.

6.7 Summary

In this chapter, I have presented and discussed findings on the factors that motivate smallholder farmers to continue living in flood prone areas. Smallholder farmers living in flood prone areas are aware of the changes in the frequency and intensity of floods. Self-perceived vulnerability to floods however is subjective and was defined in various contexts. Smallholder farmers value their livelihoods in the flood prone areas. As a result, living in the flood prone areas has enabled them to have a variety of food including maize, fruits and vegetables. Smallholder farmers earn extra cash and food through letting out their farms during drought and winter. In addition, they have good social networks with smallholder farmers that live upland which forms part of their livelihood.

However, policy makers focus on advising them to move upland thereby missing opportunities for discussing and exploring other adaptation strategies with the smallholder farmers. In agreement with Page (1999), dialogue between people of different powers, social status and different perspectives is critical to reduce inequalities in a society due to political, social, and economic factors. A lack of dialogue between the smallholder farmers living in the flood prone areas and all

relevant stakeholders creates misconception of critical aspects of vulnerability and the livelihood of the affected people, which then results into challenges in addressing vulnerability to climate change variability issues at local level. In addition, this chapter illustrates that some groups of people would want to relocate upland but they have inadequate resources to do so. This chapter therefore also illustrates the need for governments, that request communities to relocate upland, to facilitate the resettlement process by providing adequate resources for settlement in the new areas (Likuwa, 2016). This study shows that the lack of government support to the groups of people that are more vulnerable to climate variability will exacerbate their vulnerability to climate variability both in the flood prone areas and upland.

CHAPTER SEVEN: ADAPTATING TO FLOODS

7.1 Introduction

This chapter presents findings and discussion on how smallholder farmers are adapting to floods in-situ. Several themes emerge here, including, the role of assets and the role of social networks. Smallholder farmers revealed that they have valuable assets such as land, livestock, bicycles and radios, and that these assets assist them in various ways in coping with the floods. They also revealed how social networks with the upland communities help them during floods and how they also assist the smallholder farmers living in the upland areas to cope with the droughts that they face. It is clear that there is an interdependent relationship between the smallholder farmers living in the flood prone areas and those that live in upland areas, thus smallholder farmers help each other to cope with climate variability.

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[9], 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. This chapter presents an understanding of the opportunities that exist in the flood prone areas and the challenges that the smallholder farmers experience, both within and outside the influence of the local communities themselves.

The smallholder farmers 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 (as detailed in the previous chapter, chapter 6). They are referred to locally as ‘anthu akumadzi’, meaning people who come from a place that is surrounded by water. This chapter therefore

[9] External support in this case is defined as any form of support, be in cash or kind from other family members, friends, government or humanitarian organisations

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.

7.2 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 the smallholder farmers 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 smallholder farmers 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.

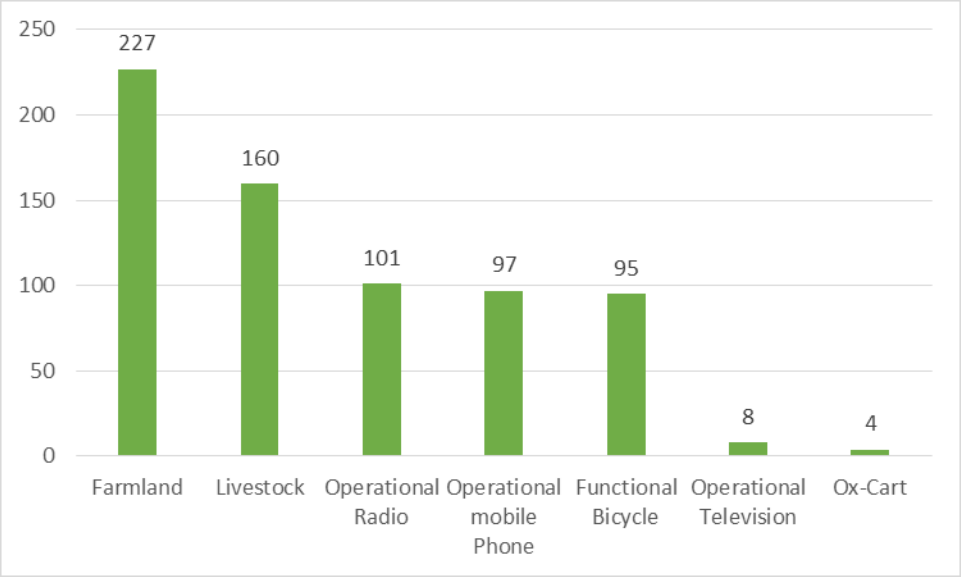


Figure 7: Assets Owned by Farming Households Participating in the Household Survey

7.2.1 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 smallholder farmer 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 smallholder farmer 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 '*Smallholder farmers living in the areas that flood are 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 farmer relayed that '*Farmland is also a source of income for most of us, smallholder farmers 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 farmers' ancestors has created a form of security that enables them to sustain their livelihoods in times of droughts and minimal flooding. Smallholder farmers 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 smallholders' 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. Smallholder farmers 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. Smallholder farmers living in the flood prone areas have been perceived as stubborn victims seeking sympathy from their governments and humanitarian organisations (Nyasatimes, January, 2015). This chapter emphasises that a holistic

understanding of adaptation practices and the significant role of farmland in the flood prone areas is critical in development and resilience studies. There are also other assets that the smallholders have that enable them to adapt to living in the flood prone areas as will be presented in the following sections. Firstly however, I will discuss how these smallholder farmers have been growing their crops and handling their crops after harvesting as another aspect that needs to be examined in local adaption to climate change in the flood prone areas.

7.2.1.1 Crop Production

The smallholder farmers 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 farmers 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 the smallholder farmers 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 2015 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 a 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 smallholder farmers 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 smallholder farmers. This also offers an opportunity for joint experimentation of agricultural research institutes and smallholder farmers 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 farmers 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. During a focus group discussion in TA Kunthembwe in Blantyre district, some smallholder farmers indicated that they stopped practising CA after funding for the agricultural activities ended. However, in this case, there are two issues which could have contributed to this according to the household survey. Firstly, that CA is not affordable to some smallholder farmers and secondly that the smallholder farmers were only motivated to practice CA because they were identified as project beneficiaries but were not interested in the intervention. There is lack of proper

technical communication between the smallholder farmers 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. Another aspect that was evident in the flood prone areas is that the smallholder farmers struggle with handling their crops after harvesting as will be discussed in the next section.

7.2.1.2 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 smallholder farmers are still struggling with how best they can produce more in some cases, the government is focussing on how to store the produce. According to the household survey, about 98% of the smallholder farmers 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 smallholder farmers hence some smallholder farmers do not know or understand why some changes are necessary. Even for a

change in new farming technologies, most of the farmers 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 smallholder farmers 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 the farmers because they have huge pressure on their work and time is limited. In addition, he indicated that for some farmers, 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 smallholder farmers in the flood prone areas. The specific roles will be discussed in the following section.

7.2.2. The Role of Technologies and Transport in Adapting to Floods

Radios were also mentioned as part of the valuable assets that smallholder famers have acquired. Radios are very useful to smallholder farmers in their livelihood as well as adaptation to climate variability. '*Radios are very important to us because we hear on the radios information on how to grow crops, the type of crops to be grown and also warnings that there would be either droughts or floods*' (FGD #2, TA Ndamera). '*Sometimes we hear from the radios that the areas will be flooded. Even though it is not very specific, we know that we might experience floods. Radios are very important nowadays. We also hear from the radios when some places are experiencing floods and that also helps us to prepare accordingly. For example, when they say that TA Mlolo is flooding, we know that we will be next*' (KII #11, TA Nyachikadza). Radios form a very important means of communicating important information to smallholder farmers.

Regarding the specificity of the flooding information, Malawi as a country is investing in the early warning system which would make certain that the information on floods is specific with appropriate information that would enable the smallholder farmers and other smallholder farmers to take appropriate action (DoDMA, 2016). This thesis emphasises that enhancing the effectiveness of climate change information on radios is one of the most effective ways of enhancing adaptation to floods and climate variability. Investing in early warning system is hence considered appropriate to enhance effective adaptation to environmental changes. However, it is important to be mindful that in some cases, climate information is being misunderstood hence a need for transparency and uniformity on the information that is sent out and how best it can be understood without distortion (Buys et al.,, 2014). There is much debate on climate related information on what is to be believed and by whom due to different uses of the climate information hence creating confusion to the people who need to hear and utilise the climate information (Ibid). Caution is therefore needed when generating and communicating climate related information in order that it can have a meaningful impact on the lives of those who are heavily affected by the floods, droughts and climate variability.

In addition to radios, mobile phones and bicycles are also used by smallholder farmers and community members to deliver climate related information, particularly in hard to reach areas and some areas that have poor signals for radio transmission. '*When we get information about floods from the Department of Disaster Management Affairs, we make certain that we pass the information to Traditional Authorities who then send their messengers to deliver the messages to all the relevant places. We send them letters which they deliver using bicycles and sometimes through mobile phones*' (KII #1). Bicycles are hence an effective means of delivering climate related messages in rural communities that are affected by floods. Bicycles are also used by smallholder farmers as a form of transport to community meetings that are held at the Traditional Authority ground. '*Usually, when there is an important communication regarding our communities, including climate related information, we are told to go to the Traditional Authorities' ground to attend the meeting. Since it is very far for some of us, we use our bicycles as a source of transport*' (FGD #6, TA Mbenje).

Bicycles are also used to transport agricultural produce to the market or to buy and collect household items from the market. '*During market days, we carry our bags of maize and bags of rice to the market for sale. We usually sell surplus but sometimes sell what we would need in years when our crops have not done well*' (FGD #3, TA Ndamera). '*During dry years, we go to distant places on our bicycles to do piece works to get some money that we would need to buy food, soap and pay fees for our school going children. A bicycle is indeed a valuable asset to most of us, and it helps us in times of both floods and droughts*' (KII #45, TA Mlolo). Bicycles are also used as a source of generating income through transport businesses also known as *shapa*. '*Bicycles generate income for some of us, we carry people to various places and charge about 300 to 500 per trip depending on the distance. In a month, we make enough to sustain our households. Bicycles play a very important role in our lives, more especially here in the rural areas. Apart from carrying people as a form of transportation, we sometimes carry their goods, crops and even livestock to various places*' (KII #17, TA Mbenje). Bicycles play a significant role in the lives of the smallholder farmers living in the flood prone areas and that role needs to be enhanced strategically to adequately equip smallholder farmers to face climate change challenges effectively. This presents a novel contribution to literature in that bicycles help communities to cope with the floods. Bicycles are a form of transport during temporary migration and provide a source of income that supports the livelihood of the smallholder farmers living in the flood prone areas. The other important asset that was mentioned was livestock, which will be discussed in the following section.

7.2.3. 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, the smallholder farmers 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 smallholder farmers 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. Smallholder famers 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, 2015). 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, 2015). Another smallholder farmer 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, 2015 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, 2015). Another smallholder farmer 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, 2015). 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 smallholder farmers 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. Smallholder farmers 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 smallholder farmers 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.

Smallholder farmers 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, 2015). '*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, 2015). Another smallholder farmer 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, 2015). 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers cope with the floods.

7.2.4 The Role of Social Networks in Adapting to Floods

Friendships play an important role in the lives of the smallholder farmers living in flood prone areas. The relationships create inter dependence between the farmers living in upland areas and those farmers living in flood prone areas. These links are very important and indicate how pro-active farmers are in order to solve the problems they face in a way that is manageable, affordable and sustainable to them. The social networks imply that in some cases, the floods are manageable at local level. Some families provide shelter to farmers living in the flood prone areas during flooding whilst the farmers living in flood prone areas provide land for farming during droughts and winter as indicated earlier on. '*During floods, we seek shelter from our friends living in upland areas, both in Malawi and Mozambique. Most of us have good relationships with them and we behave as one, there are no border issues during floods*' (KII #9, TA Nyachikadza). During an interview with a key governmental official, it was evident that the smallholder farmers have strong social networks with smallholder farmers in Mozambique.

The arrangement between the smallholder farmers in the two counties have been there for a very long time even though there is no formal arrangement pertaining to this effect between the two countries. '*During floods, some of the families that are affected by floods from Mozambique come to the Malawi side for shelter and we accommodate them. The same way sometimes, Malawians also find shelter in Mozambique during the floods. This local arrangement has been there and the*

Districts both here in Nsanje, Malawi and counter parts in Mozambique are aware of this. We coordinate very well and have had no issues regarding environmental refugees. This is one case where border issues are not a barrier to enhance social networks between the people affected by the floods and the communities living in upland areas' (KII #1). '*During drought, we offer some of our land for farming to our friends who live in Malawi and Mozambique. We do not care about boundaries, we help each other like that'* (KII #37, TA Mbenje). The evidence that the smallholder farmers negotiate amongst themselves to support one another during floods demonstrates how social networks between the smallholder farmers that are affected with the floods are strong and that they are able to manage the relationships on their own without the involvement of the government. In some cases, environmental migrants are framed as security threats beyond international borders (Ransan-Cooper et al., 2015) but this these participants illustrate that the interdependence between the communities powerfully prevents possibilities of fighting over resources.

Social networks have had a significant impact in the lives of these farmers to the extent that the relationship and ties have become strong with time. During the January 2015 floods, some farmers in the upland areas who had very close relationships with those that are affected and some form of interdependence provided food and other essentials to some of their friends they have ties with who were living in camps. This also enabled the flood victims to be better off in terms of the provisions that were given to them. Due to a large number of people that were affected by the floods, the government of Malawi could not afford to provide enough food portions per household. The relatively poor households with no links with the upland communities suffered more and had to find other ways of making certain that they had enough provisions for themselves. '*During our stay in camps, those that have friends with those that are not affected with the floods receive food, soap, clothes and sometimes firewood from their friends whilst some of us who have no friends have to depend on the small things we receive from the government. Most of the times, it is not enough*' (FGD #5, TA Mbenje). In addition, another smallholder farmer indicated that; *'it is us the poor who suffer more, we do not have anything to offer to people who live in upland communities hence we fail to make dependable friendships with them, it is only those who are better off and rich that have some*

reliable friends. We go out to do piece works and sometimes collect firewood for our friends in camps to get money to buy ourselves more food' (FGD #8, TA Mlolo). The evidence on relationships based on material belongings and wealth is critical in understanding how poverty creates various forms of vulnerability and exacerbates vulnerability in various contexts. In this case, those who are poor suffer more whilst those that have other resources are better off due to support from their friends.

Farmers with no social networks were more vulnerable to loneliness and needed more psychosocial support services from the government and other donors unlike those that had ties with upland communities. Whilst those with no social networks were always in camps, those with social networks could go to nearby villages to chat, relax and keep their mind off their misery. Their children could also interact and play together hence such children recovered to the shocks earlier that those that did not have any relationships with the upland communities. Apart from the inter-dependence in times of floods and droughts, I also observed that it is healthy for communities to relate because there is a huge benefit. In other cases however, there were some families in upland communities that adopted the most vulnerable households with no social networks and provided their basic needs as a way of making their lives easier in camps. '*We try as much as we can to organise a few household needs for those who are the most vulnerable in camps, there are a number of us, like a group of 15 households who adopt the poorest households, the elderly and child headed households. We give them food, soap and other basic needs. However we have to admit that due to the increase in the number of those that need such help, we have failed to adopt everyone, but only 5 households per flooding season*' (KII #40, TA Mbenje).

This section provides evidence of harmony and mutual benefits between the flood and drought victims that need to be explored further. There is need to defend the concept of environmental refugees as not being a total threat to human security and livelihood but as a means of adapting to climate change. It is fundamental to understand the complexity of the underlying causes of environmental migration, the dynamics of climate change impacts and climate change advocacy by civil society organisations. Nishimura (2015) suggests that there is a need to understand and

explore international refugee issues that can create more opportunities to effectively adapt to the effects of climate change. My study also reveals such circumstances where opportunities, rather than social security threats regarding environmental refugees should be emphasised in order to promote environmental migration as a climate change adaptation strategy. Due to increased intensity of floods, as evident in the January 2015 flooding event, some areas that were not affected in the past are currently being affected by climate variability and environmental degradation. This therefore suggests that migration due to climate variability will continue to rise with possible permanent environmental refugees in some areas. As climate variability continues to cause devastating effects in various spatial locations, it is inevitable that cases of environmental refugees will increase even beyond international geographical boundaries. The next section presents how institutions and organisations play an important role in mediating and facilitating adaption to floods within the national boundaries.

7.3 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, non-governmental organisations have also supported the communities and households to cope with the floods.

7.3.1 Household and Community Dynamics, and Adapting to Floods

The communities in Nsanje are culturally patrilineal. This is where the women settle at the man's village or clan when they get married, living there as long as they are married and all the children are considered to belong to the father. The women who were married to men who provided for the home and were taking up responsibility in the home, indicated that dealing with main household problem is the husband's duty. For those who are married to men that neither provide the necessary food nor meet the household demands have a duty to make sure the household needs are met,

including making certain that there is enough food in the household. During a woman focus group discussion in Traditional Authority Mlolo, one woman said that '*In this community, those who are lucky to have been married to men who buy food in the home, soap and pay school fees for the children depend on their husband to solve the household problems, for some of us whom the men are hardly at home, we fend for ourselves and we have to deal with the household* problems' (FGD #9, TA Mlolo). In female headed households, the females are responsible for providing food for the household on their own without support from relatives

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.

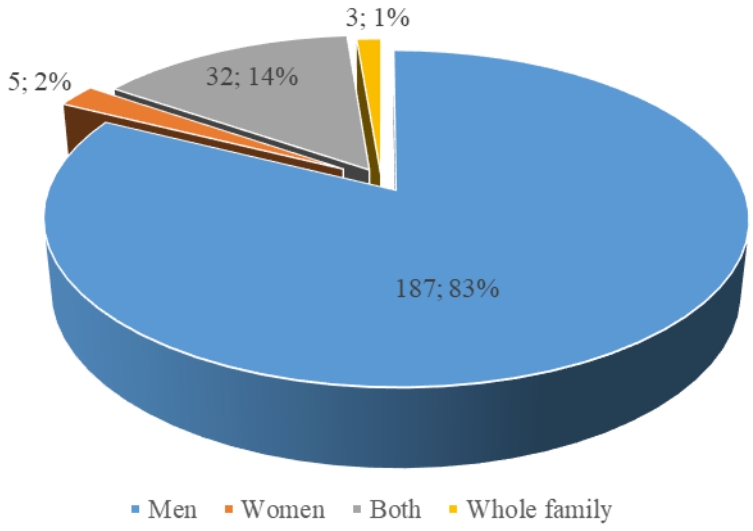


Figure 8 shows who the responsibility for all decision making falls to at household level amongst participants in the study (n = 277)

During in-depth interviews with farmers who had leadership positions and during focus group discussions, all the famers 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 farmers 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[10] 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 smallholder farmers 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 farmers isolate themselves, they are likely to continue being more vulnerable when a disaster strikes. There are no deliberate efforts designed to encourage such farmers 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.

[10] Piece work for this community mainly involves working on other people's farms in exchange of either a wage or food on a daily or weekly basis.

7.3.2 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).

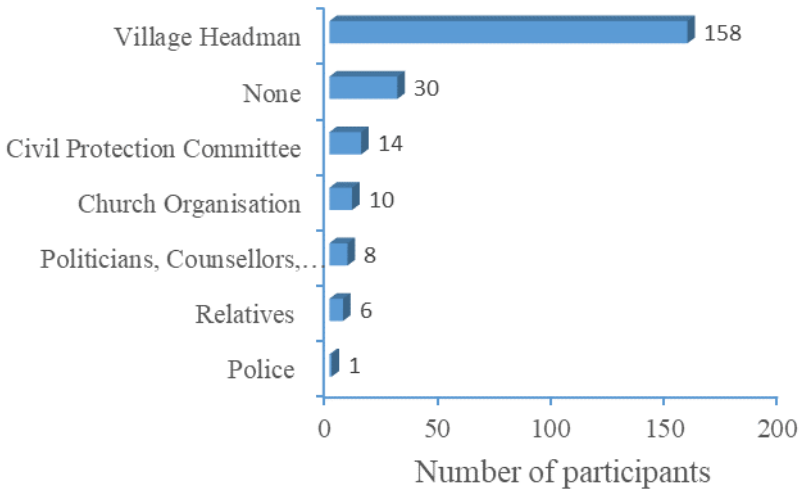


Figure 9 Shows Responses during a Household Survey on who is Contacted First when Disaster Strikes at Community Level (n = 277)

According to fieldwork discussions, the majority of the smallholder farmers indicated that community leaders provide security and communities' short and long term solutions during a crisis, including a disaster such as flooding. The farmers 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 farmers 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 socio-economic status and social group identification. However, 10 out of the 30 households that indicated not to consult anyone when a disaster strikes 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.

7.3.3 The Role of Local Organisations in Adaptation to Floods

The church and other organisations within the communities also play a very important role in helping communities during times of flooding. Church leaders sometimes provide accommodation in their churches and even some church members host some displaced families. The police also play an important role during a flood crisis. During focus group discussions, the participants indicated that the police own boats which are used to rescue the farmers living in flood prone areas and move them to upland places where temporary camps are established to accommodate the flood victims. These results also indicate the important roles that institutions have during disasters and how much people rely on them. In addition, Schools were mentioned as places where people evacuate to during floods, where they are accommodated in school blocks. This strategy has however been controversial because it affects the education sector as students have no space to study. During a post disaster meeting in Nsanje, it was revealed that this has been a short term effective solution with adverse impacts on the education sector.

During the January, 2015 floods, some schools were closed for over a month and during the district disaster meeting that I attended, the District Education Manager and other community representatives expressed concern that the students from those schools which were acting as evacuation sites will be behind the school syllabus and will give the existing few teachers pressure to help them catch up on the material they have missed. However, during that meeting that was held in February 2015, it was clear that schools will continue being used as evacuation sites during flooding unless the government and other humanitarian organisations construct and establish evacuation sites with proper accommodation and necessary

facilities such as water and toilets. It is also evident that flooding will continue and that the Malawi Government has not adequately invested in proper and sustainable climate variability adaptation planning (Climate and Development Knowledge Network and Overseas Development Institute, 2015) therefore suggesting that the communities will continue to be heavily affected by the floods and that the education sector will suffer during the floods. This lack of planning for climate adaptation is evident at the local level and there is a concern from stakeholders that the lack of disaster preparedness and planning is affecting other important sectors in the communities, including but not limited to the education sector. This also raises questions about how local adaptation can be successful when there is no adequate planning and preparation for it at all levels.

Leaders in churches, school, police and other local organisations take community problems as their own and are aware of what they are required to do during the floods. However these church leaders, committee members and leaders indicated that '*we know what to do during floods but lack the finances that would enable us to help practically*' (FGD #1, TA Ndamera). One church elder in Traditional Authority Mlolo indicated that knowledge in itself without adequate resources in terms of finances and rescue equipment is ineffective. '*Those who are affected by the floods come to us as people who are trained but we are also helpless when a disaster strikes. This is a burden to us as we do not have funds to serve the communities that are looking up to us*' (KII #43). When leaders in local churches and organisations were interviewed, they indicated that apart from their own personal problems, they prioritise community problems because they are held responsible by the community members and they do not want to let them down. This was also revealed during the household interviews, where at household level, each household indicated that when there is a problem at household level they approach the household head, be it male or female and when disaster strikes, they go to local committee members, church, schools and chiefs for direction. Culturally, the chiefs have all the powers at community level just like the head at household level.

An important aspect of the role of institutions in the flood prone areas however is that as much as they may seem to be functional, they are limited when it comes to

assisting the flooding communities because they lack resources. Resources are centralised in Malawi under the Department of Disaster Management Affairs. It is very unlikely that successful local adaptation will be achieved in circumstances where the resources are centralised and only development structures are amongst the locals themselves. The village committee can only facilitate the effective distribution of relief items and it can never empower communities to manage the floods.

7.4 Summary

This chapter on local adaptation has unpacked the roles of valuable assets in adaptation to living in flood prone areas, including farmland, livestock, bicycles, radios and mobile phones. These assets were described as valuable by the smallholder farmers living in the flood prone areas because of the significant roles the assets play in their livelihood. In addition, it has presented the role of institutions such as households and communities, and organisations such as churches, schools, police and government departments. Local non-governmental organisations, including community based organisations also play a major role before, during and after the floods.

The findings reveal opportunities in flood prone areas that arise from owning assets, renting out farmland, social networks and various institution therefore suggesting that all is not lost in flood prone areas. These local adaptation strategies ought to be acknowledged and supported in order to strengthen existing efforts to cope with the devastating effects of floods and climate variability rather than introducing new ideas that remain ineffective As much as innovation in new ways of coping with the floods is encouraged, it is relevant to also support existing strategies that have been proven to reduce vulnerability to the floods and other forms of climate variability. However, just like other vulnerability studies reveal, the poorest of the poor, women, the elderly and other marginalised groups are still more vulnerable even under the existing systems of adaptation. This chapter therefore also emphasise the need to find ways of adequately targeting and supporting the marginalised groups to enable them to cope with climate variability.

Although the chapter highlights the opportunities in the flood prone areas as part of enhancing adaptation at community and household level, the next chapter agrees with Whaley and Cleaver (2017), who discuss the functionality of water point committees and community based organisations in Sub Saharan Africa. Community Based Interventions are good but the implementation of adaptation strategies at such levels is limited due to several factors which include power dynamics and limited resources, therefore should not be romanticised. Community Based Interventions need to be unpacked further to address power dynamics, the socio-economic context and how these community based structures interact with development partners and government representatives, in order to be more appropriate and to achieve the desired outputs that include successful adaptation to floods and alleviation of poverty.

CHAPTER EIGHT: 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 Blantyre Rural Districts 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.

8.1 The Role of Gender and Culture in Adaptation

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.

8.2. 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 (Ibid).

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.

8.3 Community Power and Capacity to Cope

In Nsanje, men are considered to be more powerful than women because it is the woman that moves to a man's home. It was observed that women are mostly at home, taking care of the children and doing household chores, even if they actively take part in farming. However, when it comes to project activities, women actively participate when the chief demands that the projects be implemented and the husbands give them authorisation to do so; at least this is the case for those women who are married. As one woman describes; '*for men, they usually take part in developmental meetings, but hardly participate in community and project activities. Participation in such kind of activities by men is usually done if the men themselves benefit directly and if the chief has summoned the men to participate*' (FGD #9, TA Mlolo). This however reflects how men prioritise the household needs and focus on activities that will enable them to have more food and other needs in the home as discussed previously.

The patrilineal culture echoes the responsibilities that some of the men have and the sense of provision that lies in them in the community. A farmer who said he attends developmental meetings but never takes part in the actual implementation said that '*for most men in the villages, we would want to hear what the development partners and the government has brought to us and make rational contribution where necessary, even though in most cases, what they say has no significant impact. It is the men, being household heads that are needed in such meetings because women never talk*' (KII # 37, TA Mlolo). This point was also observed during focus group discussions comprising of both men and women where women left the men to talk and would just agree. As a focus group facilitator, I had to urge women to contribute

and reminded the women why it was important that they contributed. This clearly indicates how women in such environments felt that they could never stand up against men and even make their points heard if they had important insights during a discussion. Even at household level, the women indicated that they never contribute any ideas when their husbands are at home because the husbands misunderstand them and it is considered to be rude. This communication issue based on hierarchy and perceived power relations is also experienced at district, national, regional and international level, suggesting that exploring and addressing challenges in power relations, dynamics and politics at all levels could eventually contribute towards effective adaptation to climate variability.

This chapter acknowledges that gender roles in local adaptation to floods and climate variability are very complex, at both the household and community level. In these communities, there have been gender and women empowerment programs for close to 5 years but according to the responses from the research participants, there has not been notable changes in the perceptions of the women and men towards the way issues are addressed in the household or community at large. '*We have a women empowerment and gender based violence projects in our communities. These projects are there to empower women but our culture does not allow women to be able to make decisions in the home and be able to do things that are expected to be done by men. As a result, the project activities end outside the home. In the home, these women are still oppressed*' (KII #45. TA Mlolo). Out of tradition, women are supposed to respect the men and it is clear that the issues of respect and power in the flood prone areas is particularly complicated since in some cases those who are perceived to be weak become more vulnerable within the existing vulnerability contexts.

This perception of respect whereby women feel so inferior to talk despite having opinions and even fear of being misunderstood by their husbands and men in the community is another factor that is leading to women being more vulnerable and abused in flood prone areas. This condition also implies that local adaptation strategies cannot be implemented successfully whilst issues of respect and power benefit only men suppress women. Overall, there is evidence that reveals that issues

of vulnerability within the flooding areas goes beyond the floods, but it is exacerbated by other facets of people's lives within the particular environment. Socio-cultural transformation strategies involving women is therefore recommended to reduce exacerbated vulnerability in flood prone areas that arises from socio-cultural factors in addition to the floods.

This situation slows down development as some men do not allow their family members to participate in any development activities. I interviewed one female farmer who said that '*I am not allowed to take part in any community activities because my husband feels such gatherings expose women to other men and that I will eventually start going out with other men*' (KII #29, TA Mbenje). Another man also indicated that '*most men in this community, including myself never allow women to go out to such gatherings due to fear that they will be meeting other men. In that case, it is us men who attend such meetings and will rarely tell our spouses what the meetings were about. Due to respect, the women never even asks us what the meeting was about*' (FGD #3, TA Ndamera). In this case, respect is used as a weapon of abuse and women live in fear. This dimension of respect, desperation and fear of women being single in the communities leads to more forms of abuse and vulnerability to women whilst the men feel so powerful and uncontrollable.

Whilst these communities have to suffer the effects of floods and droughts together, regardless of gender, power and respect issues, women suffer more as they find means of managing their households in an oppressive environment. Unless there are programs that change the attitude of the communities living in flood prone areas towards respect and power dynamics in households, all the projects that aim at empowering women and gender equality initiatives will not yield results. The wider attitude of cultural values and respect that slows down successful adaptation needs to change to be able to adapt to the floods and climate variability in the flood prone areas. Apart from technical project designs in adaptation and gender related programs, project staff are not mostly aware of such attitudes and do not explore effective means of addressing such issues that are usually area specific to be able to enhance inclusive and meaningful local adaptation to floods. Although attitudinal changes might take longer it is critical to explore how best to deal with such cases

and incorporating ways of dealing with such cases during project implementation at all levels. I would even suggest an initiative to have such issues addressed in schools so that as pupils get educated and these ideas stick in their minds.

In addition, the fact that the children in my case studies grow up in these environments, it also creates an inter-generational problem that might never be addressed. During field observation, I watched how boys were playing with girls and mocking them and how this attitude has a potential to reduce confidence in the girls as they grow to become women. The future women in this society might grow up feeling so inferior to men and suffering abuse from fellow boys if no deliberate effort is made to instil confidence in the girls. However, this is my personal observation and I acknowledge that this might not be the case in the future as communities are dynamic and attitude and perception is influenced by several factors. With this in mind however, I suggest adaptation interventions that address the barriers to development and adoption of adaptation strategies such as issues of gender and power relations and give women the self-esteem they need to participate and contribute against their vulnerability to floods, drought and general abuse. Unless these women are themselves able to understand the need to stand up against abuse and contribute towards their own empowerment and development, issues of gender bias will still remain and poverty will stay in these communities. Unless the communities themselves see the gender inequalities as a hindrance to their resilience and poverty alleviation, no adaptation initiatives will yield results. As Boissière et al., (2013) suggest, there is also a need for the victims themselves to be given a chance to identify issues that are deterring them from developing and how they think they can address them effectively. These women know that they are oppressed and somehow abused but because of the marital status which is culturally valuable, they tolerate abuse and thereby do not want to take any action against their offenders in the homes and community.

This aspect of gender relations and power in the lives of the flood victims is crucial as it will enable development partners and government to understand social norms that can never be addressed with adaption programs and therefore limits the success of the programs. This indicates some of the reasons that have led to

exacerbated vulnerability in flood prone areas, thereby justifying why communities have failed to be resilient to floods and drought over time. This also reveals how some researchers and development partners ignore the intrinsic community norms and culture that deter the success of projects. Most practitioners and development partners think for the communities and develop problems and solutions that are in themselves not addressing the social problems within the communities. It is prominent that women's empowerment and gender equality programs in these communities have failed to dissolve abusive cultures in the areas. It is also prominent that even though the smallholder farmers take part in the programs, they still hold on to their tradition and culture. This suggests that those that design projects need to rethink and redesign the projects in a way that enables the smallholder farmers living in the flood prone areas to stop tolerating intentional and unintentional abuse that hinders the success of adaptation programs in their communities. In addition, there is need for academics to critically explore the factors and processes that hinder the successful implementation of adaptation programs to inform climate and disaster related policies with evidence and substantiated facts.

8.4 Community Practices, Social and Community Entitlements, and Capacity to Cope

In the flood prone areas, the vulnerable groups benefit through government safety net programs such as the social cash transfers and the farm input subsidy programs (FISP). These groups also benefit from various programs such as the food for work, food for asset, and cash for work amongst others. The aim of such programs is to practically help such vulnerable groups to be better off and live a dignified life. Culturally, the chiefs and other people in the village will nominate people belonging to the vulnerable groups to benefit from such programs. However, although these vulnerable groups have benefitted from such programs for over a decade, there is nothing to show for it as their lives are the same and they get more vulnerable over the years. I interviewed 5 smallholder farmers who have benefitted from such programs for over a decade but the farmers still belong to the group of the poorest of the poor.

The unexplained barriers and limits of such programs to deliver the desired output I suggest lies in the issues of attitude and perception of those that design such interventions. The question that is obvious is whether indeed such vulnerable groups need such interventions to develop or whether these are imposed. During a discussion with one of the ultra-poor farmers, the lady said that '*I benefit from several government interventions but my life has never improved. The way these projects are handled from the government offices and other people that are involved leaves the poor farmer poorer than before. I get a fertiliser coupon but do not have enough money to get the fertiliser even at the subsidised price. As poor as I am, I sell the coupon to other smallholder farmers that are better off at a slightly higher price so that I get the money to buy food and other necessities in the home this is why the farmers that are better off continue getting better off whilst the poor farmers become worse off*' (KII #31, TA Mbenje). In the flood prone areas, such interventions cannot reduce vulnerability to floods but rather as indicated, the vulnerable communities will become more vulnerable as they struggle to find means that enable them to sustain their livelihood.

Another man also belonging to the same ultra-poor group indicated that '*culturally, we are considered to be poor because we do not have enough food throughout the year and do not have any livestock. During community meetings, indeed people nominate us to be assisted. The programs are not designed to help us as such because the ones that benefit are middle class farmers and in some cases rich farmers*' (FGD #11 TA Kunthembwe). This reflects how programs miss addressing the needs of the targeted people in both adaptation and development programs. During focus group discussions, it was clear that the smallholder farmers are aware that there are some farmers that are more vulnerable to floods that are entitled to government support in order to sustain themselves. The farmers are also aware that during devastating floods, the government takes up responsibility to support the most vulnerable and affected households. Even during the floods, it was observed that all the groups of people living in flood prone areas were situated in the camps, including those that said had social networks with upland communities, and that the government and other humanitarian organisations provided relief items.

There were several factors that can explain why almost everyone, including those that seemed to be better off ended up in camps. Firstly, it could be that the communities took advantage of the support from the government and other development partners. This is normal in circumstances where there is help and people would usually pretend to be worse off when in actual fact they could survive and manage the situation on their own (DoDMA, 2012). Secondly, it could be that since the floods came unexpectedly, many people indeed lost all the assets they had, including food and livestock hence had nothing to exchange with the upland communities hence vulnerable and needed government support. One farmer indicated that unlike in an event of drought, unexpected floods are very destructive because they lose everything and they have to start their lives again. '*During the January, 2015 floods, one farmer lost about 70 cattle when he was escaping*' (KII #40, TA Mlolo). Culturally, these farmers consider having so many livestock, harvesting and storing so many bags of maize and other produce as a sign of wealth. As a sign of prestige, rich farmers accumulate such as a sign of wealth rather than diversification. This is however risky in flood prone areas as they are exposed to floods and risk losing everything just like in the January, 2015 floods. Some cultural aspects that still make farmers to be accumulating wealth in such areas are very risky and there is need to address such beliefs by as well changing their attitude and perception of life in the flood prone areas, including risk reduction strategies. Some issues and culture still embedded in these communities need to be adjusted as an adaptation mechanism. This culture of accumulating such wealth in such vulnerable areas is very risky and can be adjusted accordingly to help reduce vulnerability of such farmers and focus on empowering them to use their finances on other productive ways or even investments that can help them to be resilient in the long term.

In addition, since the farmers claim that they have strong social networks with upland communities, there is need to facilitate the enhancement of such relations which would eventually reduce government expenditure during floods and then also empower communities to provide for themselves sufficiently when disaster strikes. My study therefore reinforces the point made by Codjoe & Issah (2015) that suggests that the local cultural contexts of communities affected by floods is complex

and needs to be contextually unpacked to understand the challenges faced in local adaptation and opportunities that exist. This, can therefore indicate how adaptation programs can be effective, feasible and appropriate in those specific areas.

In Blantyre, a matrilineal culture, men usually settle in their wives home because it is a matrilineal society. An influential woman in the community pointed out that '*Women in this part of Malawi are expected to provide for the home hence do much more work than the men. In most cases, the men are not willing to invest so much because they are afraid that once they invest, the women will chase them and they will leave everything behind. The culture where a woman has much control in the home as the owner of the home is contributing to poverty because women are not fully supported by the men they marry*' (KII #49, TA Kunthembwe). This woman was speaking with experience from the matrilineal society women are over-burdened with responsibility in a different context. The factors that prevent the women from being supported are different from those in Nsanje where, due to patrilineal culture, the focus is about respect and control on the men's side whilst women are called to respect their husband and show high levels of tolerance to forms of abuse. It is therefore important to present several case studies with different cultural background that would help to unpack the dynamics and complexities of local adaptation in communities that are heavily affected by climate variability. Finally, it is also important to acknowledge that vulnerability changes over time.

As discussed earlier on under the 'role of assets in climate change adaptation', the assets are sold and the money used for disposable, daily needs rather than investments. Such practices leave farmers worse off, hence becoming more vulnerable to floods in the future events. In the event where smallholder farmers invest in assets that are stable and not affected with floods, in the event that floods occur, they could rely on those other assets and be able to recover quickly from the floods. It is clear that smallholder farmers living in the flood prone areas are not motivated to invest in assets that are not at risk with climate variability. Diversifying investments and investing in non-climate sensitive livelihoods and assets offers an opportunity for smallholder farmers living in flood prone areas to avoid economic losses due to climate variability.

8.5 Summary

This chapter presents power dynamics, political and cultural influence in the livelihood of the smallholder farmers living in the flood prone areas at both household and community level which mediate local adaptation to floods. The negative aspects of culture that reduce the opportunities for successful local adaptation, include those that do not encourage participatory decision making at household level and inclusion in implementing adaptation strategies. Significantly, the findings illustrate that the barriers and limitations to local adaptation to flooding are more complicated than often acknowledged by development practitioners and documents at district level. There are local and community specific factors that work against successful local adaption which cannot be removed or dealt with by using technical approaches. Rather successful adaption requires gradual transformation that involves the communities that are affected by the floods and those that implement projects in the flood prone areas. It is important to note however that the level of transformation that is needed in different spatial locations will depend on the level of vulnerability, and the type of barriers and limitations that the communities face. Transformation is required at different levels, household, community, district and even national and international in order to reduce vulnerability to climate variability and to empower the affected communities to cope well enough with the floods.

This chapter further exemplifies that local adaptation strategies in the study areas focus on reducing vulnerability to floods and do not attend to other community specific processes and factors that interplay within the flooding in these areas. With reference to the local adaptation frameworks that were presented in the literature review, there are indeed several factors that need to be supported to empower the households, communities and institutions so that they should be able to adapt to climate variability. In addition to those, this study highlights the need to contextually unpack and incorporate existing cultural and power dynamic issues that prevent successful adaptation to climate variability at both household and community level, during the design and implementation of climate related programs. The substantiated facts about the complexity of barriers and limitations to local adaptation such as these will guide policy makers, practitioners and communities themselves as they all strive to successfully enhance the capacity to cope with climate variability.

CHAPTER NINE: DISCUSSION: UNDERSTANDING VULNERABILITY, CAPACITY TO COPE AND BARRIERS AND LIMITATIONS TO ADAPTATION IN MALAWI'S FLOOD PRONE AREAS

9.1 Introduction

This chapter provides a discussion of how smallholder farmers living in the flood prone areas frame their vulnerability to floods and how they are coping locally. This is discussed by relating my findings with existing debates and literature on how vulnerability to floods and climate variability issues are framed by different scholars and actors. In addition, it presents an understanding of how local adaptation strategies are designed by different institutions to address the effects of climate variability, including floods with reference to what the smallholder farmers are currently doing to adapt to the floods. The chapter explores the role of the state and political issues around the management of disasters in disaster prone areas. The arguments are based on understanding how the political, social, economic and cultural factors coupled with internal limitations and external barriers to local adaptation have exacerbated vulnerability to disasters and how these same factors can be utilised to address vulnerability to the negative effects of climate variability. This discussion suggests that the factors that affect climate variability are complex in nature and are beyond just barriers and limitations, and hence require comprehensive, inclusive and transformative ways of addressing them to enhance local adaptation that also empower communities to be able to cope with the effects of climate variability. This discussion also illustrates how my findings are related to the existing literature and debates on vulnerability and local adaptation therefore very important in this field.

9.2 Reframing Discourses of Vulnerability Based on Self-Perceptions

This section presents a discussion on the existing literature on framing environmental migrants and also the importance of reframing vulnerability based on self-perceptions as my results suggest. Environmental migrants are perceived as being either victims by some institutions, security threats by governments that are more concerned with security issues, adaptive agents by mainly international and national non-governmental organisations, or as political subjects, mainly by

politicians (Ransan-Cooper et al., 2015). In the discussion on environmental migrants as adaptive agents, Ransan-Cooper et al., (2015) highlight that migration is a form of adaptation and therefore should be accepted and supported by policies to create an environment that facilitates the process. However, there is a need to unpack and account for barriers within the communities themselves that pose a threat to effective adaption to climate variability (Ibid). Eriksen et al., (2015) stress the relevance of contextual studies of how social, economic, political and cultural factors that either enhance adaptation or exacerbate vulnerability to provide an insight on how adaptation programs can be effectively designed to enhance local adaptation. Reframing adaptation is hence considered vital to understand the political nature of adaptation and how it can be explored and understood in order to address adaptation challenges.

Studying vulnerability in specific disaster prone areas is considered one of the ways in which vulnerability to climate variability is understood in relation to area specific risk, local adaptation and resilience, which has the potential of enhancing local adaptation in specific areas (Villegas-González et al., 2017). In a study conducted in Colombia, the authors indicate that the socio-cultural factors and time-scale of disasters are important elements in understanding the local risk of disasters and how disaster risks are managed locally (Ibid). Furthermore, they indicate that assessments should go beyond measuring the loss or damage of infrastructure and life, but rather should go deeper to understand the community characteristics to come up with a holistic understanding of risk and vulnerability. In terms of framing vulnerability, Colette, (2016) suggests that the current political framing of vulnerability influenced by international bodies such as the UNDSIR have resulted in decision making agencies such as governments not to take up responsibility in fixing social and political factors that create vulnerabilities. Furthermore, the political framing encourages governments that face climate related disasters to admit that they are struggling to reduce the impacts of climate variability on the citizens. Then eventually, the citizens should understand that the governments cannot take up responsibility to reduce the vulnerability (Ibid). This study adds weight and evidence to such arguments, as it presents a similar situation in Malawi where the government told the communities that live in flood prone areas to relocate upland where it is

considered safe from floods. The underlying factors that have created the vulnerability to floods in the lives of the smallholder farmers and the factors that motivate the smallholder farmers to live in the flood prone areas have been neglected thereby the proposal to relocate faced much resistance. The case of Malawi presented in this thesis reveals a situation where public policy partly undermines climate change adaptation more than supporting it at the local level. The findings presented here are contrary to a study that was conducted in the United Kingdom which found no effect of public policy on climate change adaptation (Eriksen et al., 2015). The contrasts in this study findings suggest that the same factors interplay differently in different environments therefore stressing the need to understand the interaction of political, economic, social, cultural and ecological factors in contexts and emphasising the need to differentiate adaptation strategies accordingly. For example in the Malawi case presented here, the livelihoods of the smallholder farmers are vital in terms of adaptation whilst in the United Kingdom, it could be that there are other factors, such as government support through infrastructure and social services which are critical in adaption and which may be affordable to the government. The difference in this case is that such policies would not be applicable in Malawi because the government has limited capacity to support the people who are affected by the floods and the affected people usually have to find means on their own to support themselves.

In Ghana, a study by Nyantakyi-Frimpong and Bezner-Kerr (2015) presents a case where it is evident that climate change effects are considered as part of the normal ordinary challenges that the communities face therefore suggesting that the effects of climate change is already known in the areas. Seeing climate variability as part of people's livelihood suggests that in such communities the effects of climate variability should not be separated as a major external challenge but rather responses to it need to be integrated into other part of people's lives, beyond the effects of climate change. In the Ghanaian example, it is a patrilineal society hence coupled with cultural factors, some households were more vulnerable than others (Nyantakyi-Frimpong and Bezner-Kerr, 2015). The nature and culture of such societies that are more vulnerable to climate variability including floods and droughts should be explored by those who design and implement adaptation programs to

effectively address the challenges that are communal in nature. Unlike in the global North where individualism is more popular than community approaches (Aiken et al., 2017), this thesis clearly shows how culture and communities in many parts of the global South are critical in adaptation research.

The international disaster policy through the Hyogo Framework for Action and the Sendai Framework that strongly recommend that those living in flood prone areas should relocate to upland areas to be safe has been rejected by the majority of those in the affected communities. In Bangladesh, migration has helped coastal communities to be better off in terms of livelihood assets, higher incomes and better access to amenities because the government provides support to those that have agreed to relocate (Islam et al., 2014). Whilst this may be the case in Bangladesh, the Malawi case provides evidence that the smallholder farmers would be worse off. The detachment of the government from relocation and resettlement processes indicate that the smallholder farmers would have to settle compensation costs on their own and start a new life on their own without government support. The political and complex nature of relocation has been presented indicating that there is need for external support for the migrants to relocate if they would relocate.

The discrepancies between government responsibilities towards the citizens in flood prone areas and the political agenda by the same government indicates how determined political leadership in ruling governments would do all it can to win votes. The smallholder farmers are aware that even though the government would not provide the necessary amenities in the flood prone areas, during floods, the government would send help because they are voters. This presents a situation where the smallholder farmers are being viewed by the government as political subjects. In Ghana, the government does not stop people from settling in the flood prone areas even though they remain inactive in providing necessary infrastructure to mitigate the impacts of the floods in the areas (Amoako, 2016). Malawi presents the case where smallholder farmers are willing to stay in the flood prone areas because in addition to the other factors that have already been discussed, the government will always support them during flooding in the hope to win their votes.

The absence and presence of the government and politicians during floods and years of droughts and good years influences those that live in the flood prone areas to continue living in the flood prone areas; and take warnings to move as seasonal depending on political pressures but not as a serious move by those who are concerned about their livelihood. The work of Shackleton et al., (2015) clearly indicates how the underlying causes of vulnerability and prevailing low adaptive capacity in developing countries have been neglected by policy makers at international level thereby creating adaptation strategies that are not socially just to the affected communities. A combination of assets, social networks and the seasonality of floods make permanent relocation another strategy that can exacerbate vulnerability to climate variability in the lives of the smallholder farmers.

9.3 The Realities of Livelihoods in Flood Prone Areas

This section illustrates how communities live in flood prone areas and how relevant it is to incorporate specific adaptation strategies in adaptation programs with reference to existing literature and how my thesis contributes to this knowledge. In Bangladesh, a study conducted by Xenarios et al., (2016) indicates that flood prone areas in the south of Bangladesh are less vulnerable to climate variability than drought prone areas in the North (though the authors suggest that there is need for further verification). The effects of climate variability varies in different geographical areas and the extent of vulnerability varies thereby indicating that a case based assessment of the extent of vulnerability is needed to come up with appropriate adaptation strategies. Whilst some regions fail to cope with climate variability, this study illustrates that the smallholder farmers only suffer during the flood event itself, whilst during droughts and after the floods they have an advantage due to moisture and fertile soils, hence assisting them to recover early.

The risk and factors that exacerbate household and community vulnerability to floods in flood prone areas are subjective and differentiated. In Ghana for example, a study reveals that different communities were affected differently by the same floods depending on socio-economic, political and engineering indicators, thereby by due to how these factors interplay, some communities are less vulnerable to floods than others (Antwi et al., 2015). The basis of the study in Ghana is on the perceptions of

people who do not live in the flood prone areas, hence revealing a knowledge gap around how the affected people themselves perceive the risk at both community and household level and how they are coping (Birkholz et al., 2014). In my study, the people who live in the flood prone areas are known as '*anthu akumadzi*', meaning people who live in areas that are surrounded by water. In addition, their livelihood is comprised of floods, as they benefit from the fertile soils and letting out of farm land to smallholder farmers that live in upland areas that are frequently affected by droughts. The understanding within the smallholder farmers suggests that living in upland areas imply that they will be heavily affected by the droughts and would not be able to cope without the use of land in flood prone areas too. The interesting comparison between being affected by the floods and being affected by the droughts reveals the extent to which the effects of climate variability affects different people differently based on their locations. Also, suggesting the need for tailor made adaptation strategies to suit different vulnerabilities, at different levels in various locations. In this case, adaptation strategies for the people living in the flood prone areas should not be exactly the same as those of the people who live in the upland areas and are affected by droughts.

The ability to migrate is amongst the factors that have motivated the smallholder farmers to live in the flood prone areas. Even though the smallholder farmers indicated environmental migration as an adaptive strategy for them, Radel et al., (2017) suggests that environmental migration does not enhance adaptation. With reference to enhanced livelihood through environmental migration and labour, the authors indicate that based on the experience in Nicaragua, smallholder farmers were not empowered through the migration in any way, but rather the smallholder farmers exacerbate social inequalities since they operate under certain groups of people, who are land owners in the relocated areas and are therefore perceived to be better than them (Ibid). Social inequalities indeed persist in this thesis' case-study, between the smallholder farmers that live in the flood prone areas and those that live in upland areas that are not prone to floods. During floods, the smallholder farmers who migrate to the new areas indicated that people in the upland areas call them names that reflect that they have escaped floods.

However, this thesis exemplifies that in another way, social inequalities exist in both directions, as the communities in the upland communities benefit through agriculture in the flood prone areas during droughts, and the communities in the flood prone areas benefit from upland communities through shelter. In this case, even those that are better off rent agricultural land in the flood prone areas and they migrate there during droughts. The social interaction, important networks and interdependence between the smallholder farmer living in the flood prone areas and those living in the upland areas that are not prone to flooding suggest another aspect of dealing with social inequalities between different groups of people. Depending on the season, one group becomes more vulnerable whilst the other become empowered depending on the type of asset they have; in this case, agricultural land for the smallholder farmers living in the flood prone areas and shelter for those living in the upland communities. This study therefore reveals that it is important to identify opportunities and strength in the flood prone areas because it reveals how the affected populations can capitalise on their strength and opportunities to effectively adapt to climate variability and address social inequalities and exclusion through unfavourable policies that affect them. Social relationships are very important in that they help reduce vulnerability of the communities and help affected communities to adapt to climate variability, including the floods (Usamah et al., 2014) . In the Philippines, communities that live in disaster prone areas have built resilience to disasters whilst perceiving disasters as part of their lives, the communities support each other in the flood prone areas. In addition, they have enhanced their social relationships and the government understands the validity of the settlements that are not formalised (Ibid). The understanding of such strong bonds, livelihood approach and local dynamics is important and needs to be recognised by the governments across the global South and policy makers at international level to enhance effective local adaptation through appropriate designs of programs that strengthen the existing adaptation strategies.

9.4. The Role of the State and the Political Nature of Disaster Management

This section illustrates that vulnerability and adaptation issues are also influenced by politics therefore it is relevant to understand the political nature of how vulnerability issues are handled, and how power dynamics exacerbates vulnerability to climate

variability. This discussion focuses mainly on the existing literature and how my findings relate to the existing debates. Another important aspect that has been ignored in many studies is that some disasters are climatised (i.e. are considered an effect of climate change) for various reasons, some of which are political (Grant et al., 2015). In Bangladesh for example, the authors indicate that in, climatising the 2009 Cyclone Aila and salt water intrusion was done to increase the financial aid that the government needed and to cover any irresponsibility by the government itself that led to poor management of resources (Ibid). This case is also similar in Malawi where due to poor land management, deforestation and over population that has resulted into opening farms in fragile areas has led to increasing environmental degradation that influences flash floods (DoDMA, 2012). The lack of enforcement of appropriate regulation that reduces environmental degradation has resulted in uncontrolled environmental regulation that partly influences disasters which the same government has to bear costs.

The smallholder farmers indicated that the government and the military will always help them when disaster strikes. The role of the military in this case has been to rescue people who are trapped during disaster and to deliver humanitarian aid to the affected communities in hard to reach areas. In most cases, there are helicopters from the military, World Food Program (WFP) and other humanitarian organisations that support those who are affected and trapped during disasters. The role of the military in disasters therefore should not be underrated as they play a significant role in disaster management in various areas, including during the Myanmar 2015 floods (Zaw and Lim, 2017). In addition, the smallholder farmers in this study believe it is the duty of the government through the Department of Meteorology and Climate Change Services (DMCCS) to timely warn them before the disaster strikes. Although it was indicated that there have been inefficiencies in the early warning communication, the smallholder farmers believe that the government has a duty to warn them as citizens so that they can prepare for the disasters accordingly. An interesting similar study was conducted in Australia where issues of trust, hope and source credibility in the early warning information were highlighted as very critical in early warning information if it is to serve the purpose of timely warning people living in disaster prone areas (Howard et al., 2017). The indirect dependability on DMCCS

to provide climate related information that is not reliable and accurate exacerbates the challenges in the disaster related systems and climate information.

In Nsanje, over 90% of the 227 households indicated that they are never consulted in the design of development and community projects, but rather they are informed when implementation is about to start. The 10% who indicated that they are consulted during the design of projects were people who were influential in the areas, including the chiefs and people who held big positions in civil protection matters. In key in-depth interviews, it was a concern that communities are not involved thereby providing another factor that creates resistance during implementation of any new project. Cooke and Kothari (2001) in their seminal book 'Participation: The New Tyranny?' speak about such processes whereby people are not actively involved in the design of the projects but are expected to implement activities and ideas that are created elsewhere, outside their system. Power dynamics and exclusion in the design and implementation of the climate change adaptation projects are evident in the case studies therefore highlighting that the effects of power dynamics and exclusion of the poor and most vulnerable people is manifested at both national and local level. This also creates implementation of inappropriate strategies that rather than reducing vulnerability, they exacerbate vulnerability of the already vulnerable communities. This also creates a partial understanding of how efforts to reduce vulnerability to climate variability in some areas has not produced the intended results.

9.5 Mislaid Challenges in Disaster Prone Areas

This section presents some of the challenges which are evident in the flood prone areas but are silent in disaster and climate related interventions based with reference to existing literature. This section also reveals some of the challenges that are complex and contextual in nature therefore suggesting how context specific adaptation is relevant to address specific climate related challenge in different spatial locations. This section emphasises the need for transformational adaptation with reference to existing literature and how it relates to my findings. This section is divided into two sub-sections. The first sub-section focuses on internal limits to adaptation in flood prone areas whilst the second one focuses on external barriers.

9.5.1 Internal Limits to Adaptation in Flood Prone Areas

Culture is one of the factors that pose as a challenge to successful adaptation of disasters. Nielsen and Reenberg, (2010) present a case in Burkina Faso focusing on how culture has affected local adaptation and enhances vulnerability to climate change amongst women. This case also reveals a situation where women are not encouraged by men to take part in economic activities and are being taken advantage of when they are actively involved in livelihood activities that would enhance household adaptation and resilience to floods. Many women indicated that the men in the village are insecure and jealous of their wives hence do not allow them to actively interact with others in development activities, more especially activities that include both men and women. Some of the cultural foundation in many countries has exacerbated vulnerability to climate variability in many communities. This suggests another element of adaptation that needs to incorporate important positive cultural values that promote local adaptation to climate variability. The Malawi case presents a situation where gender based violence programs are implemented by government and development agencies independently from local flooding adaptation projects. The isolation of the projects presents a challenge in that men look at the gender based violence project that aims at empowering women as a project that encourages women to be rude to men and husbands in the home. This is partly caused by misunderstanding of the women empowerment projects since they do not participate in the projects. Jones and Boyd (2011) highlight the importance of understanding the social barriers to adaptation in order to enhance adaptation and adaptive capacity that leads to sustainable development. In a study conducted in Nepal, it was clear that social barriers are complex hence presents a need for a strategic plan to address the factors which exacerbate vulnerability and social exclusion (Ibid). The Malawi case suggest the need to tackle gender based violence within the context of community adaptation to floods and enhance adaptive capacity rather than dealing with the social-cultural problems separately. The findings suggests that there is need to explore how best women can be empowered to adapt to climate variability in a way that the men understand and support the empowerment as an adaptation strategy. The smallholder farmers indicated that women are usually excluded from other livelihood activities and meetings because

the men feel that they will be seen by other men and therefore start cheating on their spouses. The study findings also illustrate that women are actively involved in the household activities and managing the home therefore they are key in the implementation of adaptation of climate change at household level.

9.5.2 External barriers to Adaptation in Flood prone areas

Climate related information that is supposed to warn communities of climate related hazards before they occur forms part of the external barriers to adaptation in flood prone areas. In 2015, floods affected many countries in Sub Saharan Africa (Overseas Development Institute and Climate Development Knowledge Network, 2015). In Nigeria, over 90% of the population that lived in flood prone areas around Lagos were informed and warned that they were going to experience floods but did not take any action because they did not have enough funds to do so, amongst other factors (Olokesusi et al., 2015). The authors of that study suggest that disaster related information needs to reach the affected population on time and be more comprehensive to help the affected communities. The information alone without adequate financial and technical support to implement the proposed strategies in the climate information is not adequate to reduce disasters. In Malawi, smallholder farmers indicated that messages did not come on time and that the messages were not comprehensive enough to help them make climate related decisions.

In addition, they indicated that they did not trust the messages because of inconsistencies and unreliability of data from the Meteorological department. The smallholder farmers were reluctant to take action after hearing the climate related information for various reasons. The Early Warning System needs to integrate new technology with indigenous and local knowledge in order to create mutual understanding and trust between the service providers and the people who need to utilise the information. In addition, there is need to unpack the opportunities and challenges they have within themselves to take appropriate action after hearing the climate related information. It is important to unpack the priorities of the communities involved and incorporate them in climate related messages that are passed on to the people who are affected by the floods. This is important because it will enable the communities, who are the recipients to feel connected to the messages and

therefore act on them. The fact that the messages are too general and that the targeted communities are disconnected to the messages contributes to communities that do not take appropriate action that would reduce their vulnerability to floods. This is another contribution of the thesis to effectively incorporate a comprehensive Early Warning System in climate change adaptation policies and strategies.

Arnall and Kothari (2015) point out another important aspect that there is a discrepancy in understanding climate vulnerability and adaptation based on the timescale, urgency and crisis between those that are elite and non-elite thus those who perceive to be knowledgeable in vulnerability and adaptation issues and those that are perceived not to be knowledgeable. The relevance of the study in the Maldives is that it indicates differences in perception amongst different stakeholders based on their assumptions and the way they understand vulnerability issues. Their study reveals the lack of integration of various perspectives of vulnerability in policy interventions (Ibid). In addition, Nagoda (2015) indicates that in Nepal, it is evident that the National Adaptation Plan of Action and Local Adaptation Plans of Action do not address contextual vulnerability, but rather, seek to address some generalised overall vulnerability thereby failing to address the factors and situations that create that vulnerability in the first place. This highlights another aspect of policy guidance where the foundations of most climate change policies in developing countries are based on the NAPAS that are political in nature and not contextual.

In Malawi, there are contingency plans made at local level to contextualise vulnerability and adaptation. The plans are based on what the communities themselves want to be supported with to enhance their adaptive capacity. However, from the research I conducted, the smallholder farmers and the government officials indicated that there is no support in terms of funding and adequate capacity to implement the local adaptation and contingency plans. It is also evident that it is difficult for governments and local councils to facilitate local adaptation without adequate financial and technical support (Byrne and Shrestha, 2014). Advocating for local adaptation without providing the necessary support to implement it poses a realistic and practical insight on power dynamics where resources are always controlled at central level when implementation is to be done at local level. In Malawi,

a big part of the disaster related funding is controlled at the central level and officers at district level indicated that there are not allocated funds to implement the local and adaptation plans at local level.

Based on experiences in Nepal, it is also evident that climate change policies do not enhance adaptive capacity to those who are vulnerable but rather creates another aspect of vulnerability through power dynamics (Nagoda and Nightingale, 2017). Nagoda & Nightingale (2017) argue that climate change policies are designed by people who are not themselves heavily affected by the things that are articulated in the policy, therefore issues of power dynamics start from the design of the projects and is manifested during the implementation as well. The facts that are advocated for in climate change policies and the processes through which these policies are designed indicate limited room for successful local and contextual adaptation hence in itself limiting successful local adaptation it strives to achieve.

9.5 Summary

Chapter 9 provides a discussion of some of the factors that have prevented effective local adaptation to floods to materialise in the flood prone areas based mainly on existing literature and debate. These factors include framing of environmental vulnerability by different stakeholders, ineffective early warning systems, inappropriate policies and misconception of vulnerability to floods. The chapter exemplifies that climate change adaptation programs and policies are seldom designed to meet the needs of different groups of people who are affected by the floods. The discrepancy between the realities in flood prone areas and what is perceived by those who do not live in the flood prone areas has exacerbated vulnerability to disasters unintentionally. This chapter therefore unpacks some of the challenges in local adaptation to floods that are key in reducing vulnerability to disasters, including floods. This chapter also illustrates that the traditional and technological strategies are not adequate to address complicated and dynamic vulnerabilities in flood prone areas. This chapter supports the scholarship in transformational adaptation, (O' Brien et al., 2012; O'Brien and Selboe, 2015b; Pelling, 2010; Pelling et al., 2015) as a reliable strategy that will address vulnerability to climate variability and enable communities to adapt to the changing climate.

CHAPTER TEN: CONCLUSION

10.1 Introduction

This final chapter summarises 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.

10.2 Research Highlights

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 smallholder farmers 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 smallholder farmers living in the flood prone areas perceive floods as part of their livelihood. The smallholder farmers 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 smallholder farmers 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, smallholder farmers 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 smallholder farmers 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 smallholder farmers living in the flood prone areas and those that live in the upland areas have made temporary migration during floods easier for the smallholder farmers living in the flood prone arear. The smallholder farmers 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 smallholder farmers 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 smallholder farmers 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, the smallholder farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers 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 smallholder farmers. 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.

10.3 Needs 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.

10.4 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. This study provides evidence that the smallholder farmers living in the flood prone areas are not willing to move and will not move to upland areas permanently. They have land which is a valuable asset used for farming, they grow crops twice every year and they let out part of their farmland to smallholder farmers living in upland communities during drought as an alternative source of income.

These farmers also have social networks and there is an inter-dependent relationship between the communities living in the flood prone areas and the communities living in the upland communities. During floods, the smallholder farmers move upland temporarily and pay rent in form or cash or agricultural commodities during floods to the upland communities. Their land and homes are used as shelter for the affected households during floods therefore it forms part of their livelihood. The symbiotic relationship between the two communities, gender dimensions, the early warning system amongst other social, cultural, economic and political factors and processes are important in framing vulnerability to climate variability and local adaptation.

This study recommends that governments and stakeholders should recognise and appreciate the complexity of responses to flooding and the creation of adaptive capacity in policies and programs they design and implement. The assumption that that people will relocate or be made more resilient is therefore not realistic. Vulnerability issues need to be understood in contexts in order to enhance the

existing local adaptation strategies that the communities have developed over time at smaller scales such as village and group village level in the Malawi case. It is also evident that vulnerability is perceived differently at household and community level. Vulnerability to climate variability is a personal problem that needs personal interventions to enhance the personal adaptive capacity. In addition, reducing vulnerability to disasters requires transformational adaptation that incorporates solutions to specific challenges relating to gendered dynamics, power relations, culture, politics and social economics in context.

REFERENCES

Addo, I. Y., & Danso, S. Y. (2017). Sociocultural factors and perceptions associated with voluntary and permanent relocation of flood victims: A case study of Sekondi-Takoradi Metropolis in Ghana. *Jamba: Journal of Disaster Risk Studies*, *9*(1). JOUR. http://doi.org/10.4102/jamba.v9i1.303

Adelekan, I. O., & Asiyanbi, A. P. (2016). Flood risk perception in flood-affected communities in Lagos, Nigeria. *Natural Hazards*, *80*(1), 445–469. http://doi.org/10.1007/s11069-015-1977-2

Adger, W. N., Brooks, N., Bentham, G., Agnew, M., and Eriksen, S. (2004). *New Indicators of Vulnerability and Adaptive Capacity*.

Adger, W. N. (1996a). Approaches to vulnerability to climate change. *Working Paper - Centre for Social and Economic Research on the Global Environment*, *GEC 96-05*. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0030418289&partnerID=40&md5=b8663e34be5b520650c5a2a866de0c05

Adger, W. N. (1996b). Approaches to vulnerability to climate change. *Working Paper - Centre for Social and Economic Research on the Global Environment*, *GEC 96-05*.

Adger, W. N. (1999). Social Vulneability to Climate Change and Extremes in Coastal Vietman. *World Development*, *27*(2), 249–269.

Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, *16*(3), 268–281. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2006.02.006

Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., … Wreford, A. (2009). Are there social limits to adaptation to climate change? *Climatic Change*, *93*(3–4), 335–354. http://doi.org/10.1007/s10584-008-9520-z

Adger, W. N., Huq, S., Brown, K., Declan, C., & Mike, H. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, *3*(3), 179–195. http://doi.org/10.1191/1464993403ps060oa

Adger, W. N., & Kelly, P. M. (1999). Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change*, *4*(3–4), 253–266. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0033494172&partnerID=40&md5=607cbe336214d062875640638cabff2d

Africa Climate Change Resilience Alliance (ACCRA). (2010). The ACCRA Local Adaptive Capacity Framework.

Afriyie, K., Ganle, J. K., & Santos, E. (2017a). "The floods came and we lost everything": weather extremes and households' asset vulnerability and adaptation in rural Ghana. *Climate and Development*. http://doi.org/10.1080/17565529.2017.1291403

Afriyie, K., Ganle, J. K., & Santos, E. (2017b). "The floods came and we lost everything": weather extremes and households' asset vulnerability and adaptation in rural Ghana. *Climate and Development*. INPR. http://doi.org/10.1080/17565529.2017.1291403

Ajibade, I., & McBean, G. (2014). Climate extremes and housing rights: A political ecology of impacts, early warning and adaptation constraints in Lagos slum communities. *Geoforum*, *55*, 76–86. http://doi.org/10.1016/j.geoforum.2014.05.005

Ajibade, I., McBean, G., & Bezner-Kerr, R. (2013). Urban flooding in Lagos, Nigeria: Patterns of vulnerability and resilience among women. *Global Environmental Change*, *23*(6), 1714–1725. http://doi.org/10.1016/j.gloenvcha.2013.08.009

Ajibade I and G. McBean. (2014). Climate extremes and housing rights: A political ecology of impacts, early warning and adaptation constraints in Lagos slum communities. *Geoforum*, *55*, 76–86.

Amoako, C. (2016). Brutal presence or convenient absence: The role of the state in the

politics of flooding in informal Accra, Ghana. *Geoforum*, *77*, 5–16. http://doi.org/10.1016/j.geoforum.2016.10.003

Antwi, E. K., Boakye-Danquah, J., Barima Owusu, A., Loh, S. K., Mensah, R., Boafo, Y. A., & Apronti, P. T. (2015). Community vulnerability assessment index for flood prone savannah agro-ecological zone: A case study of Wa West District, Ghana. *Weather and Climate Extremes*, *10*, 56–69. http://doi.org/http://dx.doi.org/10.1016/j.wace.2015.10.008

Arnall, A. (2014). A climate of control: Flooding, displacement and planned resettlement in the Lower Zambezi River valley, Mozambique. *Geographical Journal*, *180*(2), 141–150. http://doi.org/10.1111/geoj.12036

Arnall, A., & Kothari, U. (2015). Challenging climate change and migration discourse: Different understandings of timescale and temporality in the Maldives. *Global Environmental Change*, *31*, 199–206. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2015.01.011

Aryeetey, G. C., Jehu-Appiah, C., Spaan, E., D'Exelle, B., Agyepong, I., & Baltussen, R. (2010). Identification of poor households for premium exemptions in Ghana's National Health Insurance Scheme: Empirical analysis of three strategies. *Tropical Medicine and International Health*, *15*(12), 1544–1552. http://doi.org/10.1111/j.1365-3156.2010.02663.x

Bachram, H. (2004). Climate fraud and carbon colonialism: The new trade in greenhouse gases. *Capitalism, Nature, Socialism*, *15*(4), 5–20. http://doi.org/10.1080/1045575042000287299

Baptiste, A. K., & Kinlocke, R. (2016). We are not all the same!: Comparative climate change vulnerabilities among fishers in Old Harbour Bay, Jamaica. *Geoforum*, *73*, 47–59. http://doi.org/10.1016/j.geoforum.2015.05.006

Barbour, R. S. (2011). *Checklists for improving rigour in quaitative research. A case of tail wagging the dog?* http://doi.org/110.1136/bmj.322.7294.115

Baudoin, M.-A., & Ziervogel, G. (2017). What role for local organisations in climate change adaptation? Insights from South Africa. *Regional Environmental Change*, *17*(3), 691–702. http://doi.org/10.1007/s10113-016-1061-9

Bauer, s. and Scholz, I. (2010). Adaptation to CLimate CHange in Southern Africa: New Boundaries for Sustainable Development? *Climate and Development*, *2*(2), 83–93.

Baxter, P., & Jack, S. (2008). The qualitative report qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, *13*(4), 544–599. http://doi.org/citeulike-article-id:6670384

Bee, B. A. (2016). Power, perception, and adaptation: Exploring gender and social–environmental risk perception in northern Guanajuato, Mexico. *Geoforum*, *69*, 71–80. http://doi.org/http://dx.doi.org/10.1016/j.geoforum.2015.12.006

Berger, P. L. and Luckman, T. (1967). *The Social Constise in Construction of Reality: A treatise in Social of KNowledge*. New York: Irvington Publishers.

Berger, P.L and Luckman, T. (1967). *The Social Construction of Reality: A Treatise in Sociology of Knowledge*. New York: Irvington Publishers.

Birkholz, S., Muro, M., Jeffrey, P., & Smith, H. M. (2014). Rethinking the relationship between flood risk perception and flood management. *Science of The Total Environment*, *478*, 12–20. http://doi.org/http://dx.doi.org/10.1016/j.scitotenv.2014.01.061

Blaikie, P. and Brookfield, H. (1987). *"Defining and Debating the Problem" Land Degradation and Society*.

Blaikie, P. (2006). Is Small Really Beautiful? Community-based Natural Resource

Management in Malawi and Botswana. *World Development*, *34*(11), 1942–1957. http://doi.org/https://doi.org/10.1016/j.worlddev.2005.11.023
Blantyre District Council. (2012). *Blantyre District Socio Economic Profile*.
Blantyre District Council. (2014a). *Blantyre District Disaster reports*.
Blantyre District Council. (2014b). *Nsanje District Development Plan*.
Bohle, H.-G., & O'Brien, K. (2006). The discourse on human security: Implications and relevance for climate change research. A review article. *Erde*, *137*(3), 155–163. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33847075491&partnerID=40&md5=c2b2f88e3db44e4f13b0a397b0cc535a
Boissière, M., Locatelli, B., Sheil, D., Padmanaba, M., & Sadjudin, E. (2013). Local perceptions of climate variability and change in tropical forests of Papua, Indonesia. *Ecology and Society*, *18*(4). http://doi.org/10.5751/ES-05822-180413
Bougsty-Marshall, S. (2016). Flooding Wall Street: Echoes from the Future of Resistance around Climate Change. *Capitalism, Nature, Socialism*, *27*(3), 64–82. http://doi.org/10.1080/10455752.2016.1190773
Brooks, N and Adger, W. N. (2005). Assessing and enhancing adaptive capacity. In E. Lim, B., Sponger-siegmend (Ed.), *Adaptation policy frameworks for climate change: Development strategies, policies and measures*. UNDP - GEF.
Bryan, E., Deressa, T. T., Gbetibouo, G. A., & Ringler, C. (2009). Adaptation to climate change in Ethiopia and South Africa: options and constraints. *Environmental Science and Policy*, *12*(4), 413–426. http://doi.org/10.1016/j.envsci.2008.11.002
Buys, L., Aird, R., van Megen, K., Miller, E., & Sommerfeld, J. (2014). Perceptions of climate change and trust in information providers in rural Australia. *Public Understanding of Science*, *23*(2), 170–188. http://doi.org/10.1177/0963662512449948
Carson, D. Gilmore, A., Perry., and Gronhaug, K. (2001). *Qualitative Marketing Research*. London: Sage.
Cavanagh C.J., Chemarum A., V. P. & P. J. G. (2017). Old wine, new bottles? Investigating the differential adoption of "climate-smart" agricultural practices in western Kenya. *Journal of Rural Studies*, *56*, 114–123.
Chandra, A., & Gaganis, P. (2016). Deconstructing vulnerability and adaptation in a coastal river basin ecosystem: a participatory analysis of flood risk in Nadi, Fiji Islands. *Climate and Development*, *8*(3), 256–269. http://doi.org/10.1080/17565529.2015.1016884
Charmaz, K. (2006). *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*. Thousand Oaks: CA:Sage.
Chung, G. (2017). Gender-sensitive disaster vulnerability using analytic hierarchy process and genetic algorithm. *Advances in Intelligent Systems and Computing*. http://doi.org/10.1007/978-981-10-3728-3_31
Cleaver, F. (2005). The inequality of social capital and the reproduction of chronic poverty. *World Development*, *33*(6), 893–906. http://doi.org/http://dx.doi.org/10.1016/j.worlddev.2004.09.015
Coady, D. P . and Parker, S. . (2005). *Program Participation under Means-Testing and Self-Selection Targeting Methods:* (No. 191). Washington.
Codjoe, S. N. A., & Issah, A. D. (2015). Cultural dimension and adaptation to floods in a coastal settlement and a savannah community in Ghana. *GeoJournal*. http://doi.org/10.1007/s10708-015-9641-7
Colette, A. L. (2016). The politics of framing risk: Minding the vulnerability gap in climate change research. *World Development Perspectives*, *1*, 43–48. http://doi.org/http://dx.doi.org/10.1016/j.wdp.2016.06.003
Collins, S. . (2009). An understanding of poverty from those who are poor. *Sage*

Publications, *3*, 9–31.
Combest-Friedman, C., Christie, P., & Miles, E. (2012). Household perceptions of coastal hazards and climate change in the Central Philippines. *Journal of Environmental Management*, *112*, 137–148. http://doi.org/10.1016/j.jenvman.2012.06.018
Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, *11*, 100. http://doi.org/10.1186/1471-2288-11-100
Cutter, S. L. (2017). The forgotten casualties redux: Women, children, and disaster risk. *Global Environmental Change*, *42*, 117–121. http://doi.org/10.1016/j.gloenvcha.2016.12.010
Dallman, S., Ngo, M., Laris, P., & Thien, D. (2013). Political ecology of emotion and sacred space: The Winnemem Wintu struggles with California water policy. *Emotion, Space and Society*, *6*(1), 33–43. http://doi.org/10.1016/j.emospa.2011.10.006
Demski, C., Capstick, S., Pidgeon, N., Sposato, R. G., & Spence, A. (2017). Experience of extreme weather affects climate change mitigation and adaptation responses. *Climatic Change*, *140*(2), 149–164. http://doi.org/10.1007/s10584-016-1837-4
Denscombe, M. (2003). *The Good Reseach Guide for Small-scale Research Maidenhead projects*. Philadelphia: Open University Press.
Dilling, L., Daly, M. E., Travis, W. R., Wilhelmi, O. V., & Klein, R. A. (2015). The dynamics of vulnerability: why adapting to climate variability will not always prepare us for climate change. *Wiley Interdisciplinary Reviews: Climate Change*, *6*(4), 413–425. http://doi.org/10.1002/wcc.341
DoDMA. (2010). *Post Disaster Report*.
DoDMA. (2012). *Post Disaster Assessment report*.
DoDMA. (2013). *Post Disaster Recovery Plan*.
DoDMA. (2015a). *Disaster Assessment report*.
DoDMA. (2015b). *Post Disaster Needs Assessment report*.
Dodman, D. and Mitlin, D. (2011). Challenges for community-based adaptation discovering the potential for transformation. *Journal for International Development*.
Doolin, B. (1998). Information technology as disciplinary technology: being critical in interpretative research on information systems. *Journal of Information Technology*, *13*, 301–311.
Eakin, H., & Luers, A. L. (2006). Assessing the vulnerability of social-environmental systems. *Annual Review of Environment and Resources*. http://doi.org/10.1146/annurev.energy.30.050504.144352
Easterby-Smith, M.m Thorpe, R. and Jackson, P. R. (2008). *Management Research*. UK: Sage.
Enete, A. A., Obi, J. N., Ozor, N., & Mba, C. L. (2016). Socioeconomic assessment of flooding among farm households in Anambra state, Nigeria. *International Journal of Climate Change Strategies and Management*, *8*(1), 96–111. http://doi.org/10.1108/IJCCSM-07-2014-0084
Enfors, E. I., & Gordon, L. J. (2008). Dealing with drought: The challenge of using water system technologies to break dryland poverty traps. *Global Environmental Change*, *18*(4), 607–616. http://doi.org/10.1016/j.gloenvcha.2008.07.006
Engle, N. L. (2011). Adaptive capacity and its assessment. *Global Environmental Change*, *21*(2), 647–656. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2011.01.019
Ensor, J. and Benger, R. (2009). *Understanding climate change adaptation*. Rugby: Practical Action Publishing.
Ensor, J. E., Park, S. E., Hoddy, E. T., & Ratner, B. D. (2015). A rights-based perspective on

adaptive capacity. *Global Environmental Change*, *31*, 38–49. http://doi.org/10.1016/j.gloenvcha.2014.12.005
Eriksen, S. H., Nightingale, A. J., & Eakin, H. (2015). Reframing adaptation: The political nature of climate change adaptation. *Global Environmental Change*, *35*, 523–533. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2015.09.014
Evely, A. C., Fazey, I., Pinard, M., & Lambin, X. (2008). The influence of philosophical perspectives in integrative research: A conservation case study in the Cairngorms National Park. *Ecology and Society*, *13*(2). http://doi.org/Artn 52
Gaillard, J. C. (2010). Vulnerability, capacity and resilience: perspectives for climate and development policy. *Journal for International Development*, *22*, 218–232.
Giller, K. E., Witter, E., Corbeels, M., & Tittonell, P. (2009). Conservation agriculture and smallholder farming in Africa: The heretics' view. *Field Crops Research*, *114*(1), 23–34. http://doi.org/10.1016/j.fcr.2009.06.017
Godfrey, P., & Torres, D. (2016). *Systemic crises of global climate change: Intersections of race, class and gender*. *Systemic Crises of Global Climate Change: Intersections of Race, Class and Gender*. http://doi.org/10.4324/9781315737454
Goldman, M. J. and Riosmena, F. (2013). Adaptive Capacity in Tanzanian Massailand: Changing Strategies to Cope with Drought in Fragmented Landscapes. *Global Environmental Change*, *23*(3), 588–597.
GoM. (2006). *National Adapation Program of Action*.
Government of Malawi. (2006). *National Adaptation Program of Action*.
Government of Malawi. (2010). *Malawi State of Environment and Outlook Report Environment for Sustainable Economic Growth*. http://doi.org/ISBN 978-99960-21-00-8
Government of Malawi. (2014). *Shire River Basin Management Program Report*.
Grant, S., Tamason, C. C., & Jensen, P. K. M. (2015). Climatization: A critical perspective of framing disasters as climate change events. *Climate Risk Management*, *10*, 27–34. http://doi.org/http://dx.doi.org/10.1016/j.crm.2015.09.003
Green, J. and Thorogood, N. (2004). *Qualitative Methods for Health Research* (2nd ed.). Thousand Oaks: CA:Sage.
Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., van den Brink, M., Jong, P., … Bergsma, E. (2010). The Adaptive Capacity Wheel: A method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science and Policy*, *13*(6). http://doi.org/10.1016/j.envsci.2010.05.006
Haque, A. N. (2016). Application of Multi-Criteria Analysis on Climate Adaptation Assessment in the Context of Least Developed Countries. *Journal of Multi-Criteria Decision Analysis*. http://doi.org/10.1002/mcda.1571
Hargreaves, J. R., Morison, L. A., Gear, J. S. S., Makhubele, M. B., Porter, J. D. H., Busza, J., … Pronyk, P. M. (2007). "Hearing the Voices of the Poor": Assigning Poverty Lines on the Basis of Local Perceptions of Poverty. A Quantitative Analysis of Qualitative Data from Participatory Wealth Ranking in Rural South Africa. *World Development*, *35*(2), 212–229. http://doi.org/10.1016/j.worlddev.2005.10.021
Harrison, E., & Chiroro, C. (2016). Differentiated legitimacy, differentiated resilience: beyond the natural in "natural disasters." *Journal of Peasant Studies*. http://doi.org/10.1080/03066150.2016.1193011
Hirschman, E. C. (1985). Primitive Aspects of Consumption in Modern American Society. *Journal of Consumer Research*, *12*, 237–249.
Hodgson, G. M. (2006). What are institutions? *Journal of Economic Issues*, *40*(1), 1–25. http://doi.org/Article
Hof, A. F. den Elzen, M. G. J. and Van Vuuren, D. P. (2010). Including Adaptation costs and

climate change damages in evaluating post 2012 burden sharing regimes. *Mitigation and Adaptation Strategies for Global Change*, *15*(1), 19–40.
Howard, A., Agllias, K., Bevis, M., & Blakemore, T. (2017). "They'll tell us when to evacuate": The experiences and expectations of disaster-related communication in vulnerable groups. *International Journal of Disaster Risk Reduction*, *22*, 139–146. http://doi.org/http://dx.doi.org/10.1016/j.ijdrr.2017.03.002
Hudson, L. and Ozanne, J. (1988). Alternative ways of seeking knowledge in consumer research. *Journal of Consumer Research*, *14*(4), 508–521.
Hurlbert, M., & Gupta, J. (2016). The adaptive capacity of institutions in Canada, Argentina, and Chile to droughts and floods. *Regional Environmental Change*. http://doi.org/10.1007/s10113-016-1078-0
Ikejemba, E. C. X., Schuur, P. C., Van Hillegersberg, J., & Mpuan, P. B. (2017). Failures & generic recommendations towards the sustainable management of renewable energy projects in Sub-Saharan Africa (Part 2 of 2). *Renewable Energy*, *113*, 639–647. http://doi.org/10.1016/j.renene.2017.06.002
Ioris, A. A. R. (2012). Applying the strategic-relational approach to urban political ecology: The water management problems of the baixada fluminense, Rio de Janeiro, Brazil. *Antipode*, *44*(1), 122–150. http://doi.org/10.1111/j.1467-8330.2011.00848.x
IPCC. (2013). *IPCC Technical Report*.
Islam, M. M., Sallu, S., Hubacek, K., & Paavola, J. (2014a). Migrating to tackle climate variability and change? Insights from coastal fishing communities in Bangladesh. *Climatic Change*, *124*(4), 733–746. http://doi.org/10.1007/s10584-014-1135-y
Islam, M. M., Sallu, S., Hubacek, K., & Paavola, J. (2014b). Vulnerability of fishery-based livelihoods to the impacts of climate variability and change: Insights from coastal Bangladesh. *Regional Environmental Change*, *14*(1), 281–294. http://doi.org/10.1007/s10113-013-0487-6
Jones, L., & Boyd, E. (2011). Exploring social barriers to adaptation: Insights from Western Nepal. *Global Environmental Change*, *21*(4), 1262–1274. http://doi.org/10.1016/j.gloenvcha.2011.06.002
Jones, S. (2002). *Social constructionism and the environment: through the quagmire*. *Global Environmental Change* (Vol. 12).
Kakota, T., Nyanki, D., Mkwambisi, D. and Kogi-Makau, W. (2011). Gender Vulnerability to Climate Variability and Household Food Insecurity. *Climate and Development*, *3*(4), 298–309.
Khan, M. R. and Roberts, J. T. (2013). Wiley interdisciplinary reviews: climate change. *Adaptation and International Climate Policy*, *4*(3), 171–189.
Khapung, S. (2016). Transnational feminism and women's activism: Building resilience to climate change impact through women's empowerment in climate smart agriculture. *Asian Journal of Women's Studies*, *22*(4), 497–506. http://doi.org/10.1080/12259276.2016.1242946
Kirshen, P. H., Douglas, E. M., Paolisso, M., & Enrici, A. (2012). Social and cultural incentives and obstacles to adaptation to increased coastal flooding in East Boston, MA USA. In *Restoring Lands - Coordinating Science, Politics and Action: Complexities of Climate and Governance* (Vol. 9789400725, pp. 85–107). http://doi.org/10.1007/978-94-007-2549-2_5
Kosamu, I. B. M. (2013). National Level Organisation Responses to Climate Change Adaptation: A Case Study of Malawi. *Climate and Development*, *5*(1), 93–98.
Kundzewicz, Z. (2003). Extreme precipitation and floods in the changing world. *IAHS-AISH Publication*, (281), 32–39. Retrieved from

https://www.scopus.com/inward/record.uri?eid=2-s2.0-0042268521&partnerID=40&md5=8ac3a657362119fea6bc6289ebd85aed
Kundzewicz, Z. W., & Kaczmare, Z. (2000). Coping with hydrological extremes. *Water International*, *25*(1), 66–75. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0002426683&partnerID=40&md5=af143d53437968b14bab8bd7c5636820
Langridge, R., Christian-Smith, J., & Lohse, K. A. (2006). Access and resilience: Analyzing the construction of social resilience to the threat of water scarcity. *Ecology and Society*, *11*(2). Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33846072988&partnerID=40&md5=85a45bf5f69b07ea7c1e1669dcf95a01
Lara, A., Garcia, X., Bucci, F., & Ribas, A. (2017). What do people think about the flood risk? An experience with the residents of Talcahuano city, Chile. *Natural Hazards*, *85*(3), 1557–1575. http://doi.org/10.1007/s11069-016-2644-y
Lebel, L., & Lebel, P. (2016). Emotions, attitudes, and appraisal in the management of climate-related risks by fish farmers in Northern Thailand. *Journal of Risk Research*. http://doi.org/10.1080/13669877.2016.1264450
Likuwa, K. M. (2016). Flooding and its impacts on Nkondo community in Rundu, Kavango east region of Namibia, 1950s. *Jamba: Journal of Disaster Risk Studies*, *8*(2), 1–5. http://doi.org/10.4102/jamba.v8i2.168
Lincoln, Y., and Guba, E. (1985). *Naturalistic Inquiry*. London: Sage.
Ludi, E. Wiggins, S., Jones, L., Lofthouse, J., and Lerine, S. (2014). Adapting development, how wider development interventions can support adaptive capacity at the communty level, community-based adaptation to climate change: Scalling it up (pp. 36–52). London: Routledge.
Madhuri. (2016). The impact of flooding in Bihar, India on women: A qualitative study. *Asian Women*, *32*(1), 31–52. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84983436382&partnerID=40&md5=232ee91f801a1923667fbf2c853d735f
Magis, K. (2010). Community resilience: An indicator of social sustainability. *An International Journal of Society and Natural Resources*, *25*(5), 401–406.
Maguire, R., & Lewis, B. (2012). The influence of justice theories on international climate policies and measures. *Macquarie Journal of International and Comparative Environmental Law*, *8*(1), 16–35. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84867144638&partnerID=40&md5=264db2035e52756ea10aff198ad2fc18
Mahanta, R., & Das, D. (2017). Flood induced vulnerability to poverty: Evidence from Brahmaputra Valley, Assam, India. *International Journal of Disaster Risk Reduction*, *24*(Supplement C), 451–461. http://doi.org/https://doi.org/10.1016/j.ijdrr.2017.04.014
Manuel-Navarrete, D., & Pelling, M. (2015). Subjectivity and the politics of transformation in response to development and environmental change. *Global Environmental Change*, *35*, 558–569. http://doi.org/10.1016/j.gloenvcha.2015.08.012
Manyena, S. B. (2006). The concept of Resilience revisited. *Disasters*, *30*(4), 434–450.
Mason, J. (2002). *Qualitative researching*. London: Sage.
McSweeney, C., New, M. and Lizgano, G. (2008). *United Nations Development Program Climate Change Country Profile*. Retrieved from http://country-profiles.geog.ox.ac.uk
Mehar, M., Mittal, S., & Prasad, N. (2016). Farmers coping strategies for climate shock: Is it differentiated by gender? *Journal of Rural Studies*, *44*, 123–131. http://doi.org/10.1016/j.jrurstud.2016.01.001
Methmann, C., Oels, A. (2014). *Vulnerability in critical environment politics: interventions*.

(C. Death, Ed.). Cambridge: Cambridge University Press.
Middleton, C., Elmhirst, R. and Chantavanich, S. (2018). *Living with Floods in a Mobile Southeast Asia: A Political Ecology of Vulnerability, migration and Environmental Change*. (S. Middleton, C., Elmhirst, R. and Chantavanich, Ed.). London: Routledge.
Miles, M. B. and Huberman, M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. CA:Sage.
Msowoya, K., Madani, K., Davtalab, R., Mirchi, A., & Lund, J. R. (2016). Climate Change Impacts on Maize Production in the Warm Heart of Africa. *Water Resources Management*, *30*(14), 5299–5312. http://doi.org/10.1007/s11269-016-1487-3
Nagoda, S. (2015). New discourses but same old development approaches? Climate change adaptation policies, chronic food insecurity and development interventions in northwestern Nepal. *Global Environmental Change*, *35*, 570–579. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2015.08.014
Nagoda, S., & Nightingale, A. J. (2017). Participation and Power in Climate Change Adaptation Policies: Vulnerability in Food Security Programs in Nepal. *World Development*, *100*, 85–93. http://doi.org/http://dx.doi.org/10.1016/j.worlddev.2017.07.022
National Stastics Office. (2008). *National household demographic survey results*.
Neil Adger, W. (1999). Social Vulnerability to Climate Change and Extremes in Coastal Vietnam. *World Development*, *27*(2), 249–269. http://doi.org/10.1016/S0305-750X(98)00136-3
Neumann, L. M. (2000). *Social Research Methods: Qualitative and Quantitative Approaches* (4th ed.). USA: Allyn and Bacon.
Neumann, R. P. (2009). Political Ecology. In *International Encyclopedia of Human Geography* (pp. 228–233). http://doi.org/10.1016/B978-008044910-4.00580-0
Neumayer, E., & Plümper, T. (2007). The gendered nature of natural disasters: The impact of catastrophic events on the gender gap in life Expectancy, 1981-2002. *Annals of the Association of American Geographers*, *97*(3), 551–566. http://doi.org/10.1111/j.1467-8306.2007.00563.x
Neussner, O. (2014). Assessment of the early warning of typhoon Haiyan in the Philippines. In *Proceedings of the 5th International Disaster and Risk Conference: Integrative Risk Management - The Role of Science, Technology and Practice, IDRC Davos 2014* (pp. 525–528). Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924995816&partnerID=40&md5=64433b93cf69f595f6f499dee44a0108
Nielsen, J. Ø., & Reenberg, A. (2010). Cultural barriers to climate change adaptation: A case study from Northern Burkina Faso. *Global Environmental Change*, *20*(1), 142–152. http://doi.org/10.1016/j.gloenvcha.2009.10.002
Nishimura, L. (2015). “Climate change migrants”: Impediments to a protection framework and the need to incorporate migration into climate change adaptation strategies. *International Journal of Refugee Law*, *27*(1), 107–134. http://doi.org/10.1093/ijrl/eev002
Nsanje District Council. (2009). *Nsanje District Socio Economic Profile*.
Nsanje District Council. (2010a). *District Disaster Preparedness Meeting Minutes*.
Nsanje District Council. (2010b). *Nsanje District Development Plan*.
Nsanje District Council. (2015a). *District Project Evaluation Report*.
Nsanje District Council. (2015b). *Nsanje Post Disaster Needs Assessment Report*.
Nyantakyi-Frimpong, H., & Bezner-Kerr, R. (2015). The relative importance of climate change in the context of multiple stressors in semi-arid Ghana. *Global Environmental Change*, *32*, 40–56. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2015.03.003

Nyasatimes. (2012). *Floods Displace Communities in Nsanje*.
O' Brien, K., Pelling, M., Patwardhan, A., Hallegatte, S., Maskrey, A., Oki, T., … Viguié, V. (2012). Toward a sustainable and resilient future. In *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change* (Vol. 9781107025, pp. 437–486). http://doi.org/10.1017/CBO9781139177245.011
O'Brien, K. L. and Wolf, J. (2010). A Values Based Approach to Vulnerability and Adaptation to Climate Change. *Climate Change*, *1*(2), 232–242.
O'Brien, K., & Selboe, E. (2015a). Climate change as an adaptive challenge. In *The Adaptive Challenge of Climate Change* (pp. 1–23). http://doi.org/10.1017/CBO9781139149389.002
O'Brien, K., & Selboe, E. (2015b). Social transformation: The real adaptive challenge. In *The Adaptive Challenge of Climate Change* (pp. 311–324). http://doi.org/10.1017/CBO9781139149389.018
O'Brien, K., & Selboe, E. (2015c). *The adaptive challenge of climate change*. *The Adaptive Challenge of Climate Change*. http://doi.org/10.1017/CBO9781139149389
Obradovich, N., & Zimmerman, B. (2016). African voters indicate lack of support for climate change policies. *Environmental Science and Policy*, *66*, 292–298. http://doi.org/10.1016/j.envsci.2016.06.013
Olokesusi, F., Olorunfemi, F. B., Onwuemele, A., & Oke, M. O. (2015). Awareness of and responses to the 2011 flood warnings among vulnerable communities in Lagos, Nigeria. In *Global Sustainability: Cultural Perspectives and Challenges for Transdisciplinary Integrated Research* (pp. 203–223). http://doi.org/10.1007/978-3-319-16477-9_11
Olsson, L., Opondo, M., Tschakert, P., Agrawal, A., Eriksen, S. H., Ma, S., … Kaijser, A. (2015). Livelihoods and poverty. In *Climate Change 2014 Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects* (pp. 793–832). http://doi.org/10.1017/CBO9781107415379.018
Ostrom, E., Janssen, M. A., & Anderies, J. M. (2007). Going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(39), 15176–15178. http://doi.org/10.1073/pnas.0701886104
Overseas Development Institute and Climate Development Knowledge Network. (2015). *Climate Change Adaptation in Sub Saharan Africa*.
Paavola, J. (2008). Livelihoods, vulnerability and adaptation to climate change in Morogoro, Tanzania. *Environmental Science and Policy*, *11*(7), 642–654. http://doi.org/10.1016/j.envsci.2008.06.002
Padawangi, R., & Douglass, M. (2015). Water, water everywhere: Toward participatory solutions to chronic urban flooding in Jakarta. *Pacific Affairs*, *88*(3), 517–550. http://doi.org/10.5509/2015883517
Page, E. (1999). Intergenerational justice and climate change. *Political Studies*, *47*(1), 53–66. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0032623273&partnerID=40&md5=dd63e9f5bcf7c9481e5f0eb9ccb3afd4
Palinkas, I.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. and Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed methods implementation research. *Administration and Policy in Mental Health*. http://doi.org/10.1007/s10488-o13-0528-y
Palys, F. (2008). Purposive Sampling. In L. M. Given (Ed.), *The sage encyclopedia of qualitative research methods* (pp. 697–698). Thousand Oaks: Calif:Sage.
Pasquini, L., Cowling, R. M. and Ziernovogel, G. (2013). Facing the heat: barriers to mainstreaming climate change adaptation in local government in the Western Xape

Province, South Africa. *Habitat International*, *40*, 225–232.
Paul, S. K., & Routray, J. K. (2010). Flood proneness and coping strategies: The experiences of two villages in Bangladesh. *Disasters*, *34*(2), 489–508. http://doi.org/10.1111/j.1467-7717.2009.01139.x
Pelling, M. (1999). The political ecology of flood hazard in urban Guyana. *Geoforum*, *30*(3), 249–261. http://doi.org/10.1016/S0016-7185(99)00015-9
Pelling, M. (2010). *Adaptation to climate change: From resilience to transformation*. *Adaptation to Climate Change: From Resilience to Transformation*. http://doi.org/10.4324/9780203889046
Pelling, M., O'Brien, K., & Matyas, D. (2015). Adaptation and transformation. *Climatic Change*, *133*(1), 113–127. http://doi.org/10.1007/s10584-014-1303-0
Radel, C., Schmook, B., Carte, L., & Mardero, S. (2017). Toward a Political Ecology of Migration: Land, Labor Migration, and Climate Change in Northwestern Nicaragua. *World Development*. http://doi.org/http://dx.doi.org/10.1016/j.worlddev.2017.04.023
Rahman, M. S., & Di, L. (2017). The state of the art of spaceborne remote sensing in flood management. *Natural Hazards*, *85*(2), 1223–1248. http://doi.org/10.1007/s11069-016-2601-9
Raju, P. L. N., Sarma, K. K., Barman, D., Handique, B. K., Chutia, D., Kundu, S. S., … Chabukdhara, M. (2016). Operational Remote Sensing Services in North Eastern Region of India for natural resources management, early warning for disaster risk reduction and dissemination of information and services. In *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives* (Vol. 41, pp. 767–775). http://doi.org/10.5194/isprsarchives-XLI-B4-767-2016
Ransan-Cooper, H., Farbotko, C., McNamara, K. E., Thornton, F., & Chevalier, E. (2015). Being(s) framed: The means and ends of framing environmental migrants. *Global Environmental Change*, *35*, 106–115. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2015.07.013
Reid, H., Alam, M., Berger, R., Cannon, T. (2009). Community based adaptation to climate change. *Participatory Learn Action*, *60*, 11–33.
Reyes, D. D., & Lu, J. L. (2016). Gender dimension in disaster situations: A case study of flood prone women in malabon city, metro manila. *International Journal of Disaster Risk Reduction*, *15*. http://doi.org/10.1016/j.ijdrr.2015.11.001
Ribot, J. (2014). Cause and response: vulnerability and climate in the Anthropocene. *Journal of Peasant Studies*, *41*(5), 667–705. http://doi.org/10.1080/03066150.2014.894911
Ribot, J. C. (1995). The causal structure of vulnerability: Its application to climate impact analysis. *GeoJournal*, *35*(2), 119–122. http://doi.org/10.1007/BF00814058
Ritchie, J. Lewis, J. and Elam, G. (2003). *A Guide for Social Sciences Students and Researchers*. Thousand Oaks: CA:Sage.
Sadia, H., Iqbal, M. J., Ahmad, J., Ali, A., & Ahmad, A. (2016). Gender-sensitive public health risks and vulnerabilities' assessment with reference to floods in Pakistan. *International Journal of Disaster Risk Reduction*, *19*, 47–56. http://doi.org/10.1016/j.ijdrr.2016.08.024
Saito, N. (2013). Mainstreaming Climate Change Adaptation in Least Development Countries in South and Southeast Asia. *Mitigation and Adaptation Strategies for Global Change*, *8*(6), 825–849.
Samson, J., Berteaux, D., Mcgill, B. J., & Humphries, M. M. (2011). Geographic disparities and moral hazards in the predicted impacts of climate change on human populations. *Global Ecology and Biogeography*, *20*(4), 532–544. http://doi.org/10.1111/j.1466-8238.2010.00632.x

Sandelowski, M. (1995). Focus on qualitative methods: Sample size in qualitative research. *Research in Nursing and Health*, *18*, 179–183.
Sandelowski, M. (2000). Whatever hapened to qualitative description? *Research in Nursing and Health*, *23*, 334–340.
Sen, A. (2009). *The Idea of Justice*. Harvard University Press. Retrieved from https://books.google.co.uk/books?id=enqMd_ze6RMC
Shackleton, S., Ziervogel, G., Sallu, S., Gill, T., & Tschakert, P. (2015). Why is socially-just climate change adaptation in sub-Saharan Africa so challenging? A review of barriers identified from empirical cases. *Wiley Interdisciplinary Reviews: Climate Change*, *6*(3), 321–344. http://doi.org/10.1002/wcc.335
Shakya, K. (2016). Earthquake: Impact on Nepalese economy and women. *Lowland Technology International*, *18*(2), 75–82. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-85009284466&partnerID=40&md5=010dd19f853d15dd315ee98e509532f8
Sheikh, A., Smeeth, L., Ashcroft, R. (2002). Randomised controlled trials in primary care: scope and application. *Br J Gen Ptact*, *52*(482), 746–51.
Sherif, A. (2009). *Building a Targeting System for Bangladesh Based on Proxy Means Testing. Social Protection and Labour* (No. 914). Washington.
Siegel, P. B. and Alwang, J. (1999). *An Asset Based Approach to Social Risk Management: A Conceptual Framework*.
Simoes, A. F., Kligerman, D. C., La Rovere, E. L., Maroun, R., Barata, M. and, & Obermaier, M. (2010). Enhancing Adaptive Capacity to Climate Change: The Case of Smallholder Farmers in the Brazilian Semi-arid Region,. *Environmental Science and Policy*, *13*(8), 801–808.
Sohrabizadeh, S. (2016a). A Qualitative Study of Violence Against Women after the Recent Disasters of Iran. *Prehospital and Disaster Medicine*, *31*(4), 407–412. http://doi.org/10.1017/S1049023X16000431
Sohrabizadeh, S. (2016b). The Neglect of Women's Capacities in Disaster Management Systems in Iran: A Qualitative Study. *Indian Journal of Gender Studies*, *23*(3), 467–480. http://doi.org/10.1177/0971521516656080
Stake, R. E. (1995). *The art of case study research*. Thousand Oaks: CA:Sage.
Stasavage, D., & Moyo, D. (2000). Are Cash Budgets a Cure for Excess Fiscal Deficits (and at What Cost)? *World Development*, *28*(12), 2105–2122. http://doi.org/https://doi.org/10.1016/S0305-750X(00)00073-5
Stringer, L.C., Dyer, J. C., Reed, M. S., Dougill, A. J., Twyman, C., Mkwambisi, D. (2009). Adaptations to climate change, drought an desssertification: local insights to enhance policy in Southern Africa. *Environmental Science & Policy*.
Suri, H. (2011). Purposeful sampling in quaitative research synthesis. *Qualitative Research Journal*, *11*(2), 63–75. http://doi.org/doi.org/10.1016/j.geoforum.2016.07.011
Tahira, Y., & Kawasaki, A. (2017). The impact of the Thai flood of 2011 on the rural poor population living on the flood plain. *Journal of Disaster Research*, *12*(1), 147–157. JOUR. http://doi.org/10.20965/jdr.2017.p0147
Taylor, M. (2013). Climate change, rlational vulnerability and human security: Rethinking sustainable adaptation in agrarian environment. *Climate and Development*, *4*(5), 318–327.
Taylor Aiken, G., Middlemiss, L., Sallu, S., & Hauxwell-Baldwin, R. (2017). Researching climate change and community in neoliberal contexts: an emerging critical approach. *Wiley Interdisciplinary Reviews: Climate Change*, e463. http://doi.org/10.1002/wcc.463
Teddlie, E. and Tashakkori, A. (2009). *Foundations of Mixed Methods Research*. Thousand

Oaks: Sage CA.
Temple, B. (2002). Crossed Wires: Interpreters, Translators, and Bilingual Workers in Cross-Language Research. *Qualitative Health Research*, *12*(6), 844–854. http://doi.org/10.1177/104973230201200610
Thierfelder, C., Matemba-Mutasa, R., Bunderson, W. T., Mutenje, M., Nyagumbo, I., & Mupangwa, W. (2016). Evaluating manual conservation agriculture systems in southern Africa. *Agriculture, Ecosystems and Environment*, *222*, 112–124. http://doi.org/10.1016/j.agee.2016.02.009
Thomson, H. E., Berrang-Ford, L. and Ford, J. D. (2010). Climate change and food security in sub saharan africa: a systematic literature review,. *Sustainability*, *2*(8), 2719–2733.
Thorne, S. (2009). The Role of Qualitative Research within an Evidence Based Context: Can Metasynthesis be the Answer? *International Journal of Nursing Studies*, *46*, 569–575.
Toufique, K. A., & Islam, A. (2014). Assessing risks from climate variability and change for disaster-prone zones in Bangladesh. *International Journal of Disaster Risk Reduction*, *10*(PA), 236–249. http://doi.org/10.1016/j.ijdrr.2014.08.008
Trawöger, L. (2014). Convinced, ambivalent or annoyed: Tyrolean ski tourism stakeholders and their perceptions of climate change. *Tourism Management*, *40*(Supplement C), 338–351. http://doi.org/https://doi.org/10.1016/j.tourman.2013.07.010
Tucker, J., Daoud, M., Oates, N., Few, R., Conway, D., Mtisi, S., & Matheson, S. (2015). Social vulnerability in three high-poverty climate change hot spots: What does the climate change literature tell us? *Regional Environmental Change*, *15*(5). http://doi.org/10.1007/s10113-014-0741-6
Tully, J. (2013). Two ways of realizing justice and democracy: Linking Amartya Sen and Elinor Ostrom. *Critical Review of International Social and Political Philosophy*, *16*(2), 220–232. http://doi.org/10.1080/13698230.2012.757914
Turner, R. K., Subak, S., & Adger, W. N. (1996). Pressures, trends, and impacts in coastal zones: Interactions between socioeconomic and natural systems. *Environmental Management*, *20*(2), 159–173. http://doi.org/10.1007/BF01204001
Twyman, C., Morrison, J., & Sporton, D. (1999). The Final Fifth: Autobiography, Reflexivity and Interpretation in Cross-Cultural Research. *Area*, *31*(4), 313–325. http://doi.org/10.2307/20004004
UNFCCC. (1992). UNFCCC Report.
UNFCCC. (2013). *UNFCCC Report 2013*. Retrieved from http://unfccc.int/focus/adaptation/items/6999.php
UNISDR. (2005). Hyogo Framework for Action 2005-2015. *Strategy*, (January), 1–25. http://doi.org/10.1017/CBO9781107415324.004
UNISDR. (2015). Sendai Framework for Disaster Risk Reduction 2015 - 2030. *Third World Conference on Disaster Risk Reduction, Sendai, Japan, 14-18 March 2015.*, (March), 1–25. http://doi.org/A/CONF.224/CRP.1
United Nations Development Program. (2009). *Sustainable Land Management Report*.
Urwin, K., & Jordan, A. (2008). Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance. *Global Environmental Change*, *18*(1), 180–191. http://doi.org/10.1016/j.gloenvcha.2007.08.002
Usamah, M., Handmer, J., Mitchell, D., & Ahmed, I. (2014). Can the vulnerable be resilient? Co-existence of vulnerability and disaster resilience: Informal settlements in the Philippines. *International Journal of Disaster Risk Reduction*, *10*, 178–189. http://doi.org/http://dx.doi.org/10.1016/j.ijdrr.2014.08.007
Villegas-González, P. A., Ramos-Cañón, A. M., González-Méndez, M., González-Salazar, R. E., & De Plaza-Solórzano, J. S. (2017). Territorial vulnerability assessment frame in

Colombia: Disaster risk management. *International Journal of Disaster Risk Reduction*, *21*, 384–395. http://doi.org/http://dx.doi.org/10.1016/j.ijdrr.2017.01.003

Vogel, C. (2006). Foreword: Resilience, vulnerability and adaptation: A cross-cutting theme of the International Human Dimensions Programme on Global Environmental Change. *Global Environmental Change*, *16*(3), 235–236. http://doi.org/http://dx.doi.org/10.1016/j.gloenvcha.2006.02.005

Walker, B., Gunderson, L., Kinzig, A., Folke, C., Carpenter, S., & Schultz, L. (2006). A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and Society*, *11*(1). Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33745918628&partnerID=40&md5=7d9b3de6c23fc6367d6c9fd277d4ffb6

Watts, M. J. and H. G. B. (1993). The space of vulnerability: the causal structure of hunger and famine. *Progress in Human Geography*, *17*, 43–67.

Wellard, K., Daimon, K. and Sieglinde, S. (2012). Farmers on th Frontline: adaptation and change in Malawi. In D. w. Castro, A., Taylor, D. and Brokensha (Ed.), *Climate Change and Threatened Communities: Vulnerability, capacity and action* (pp. 41–56). Practical Action Publishing.

Whaley, L., & Cleaver, F. (2017). Can "functionality" save the community management model of rural water supply? *Water Resources and Rural Development*, *9*, 56–66. http://doi.org/http://dx.doi.org/10.1016/j.wrr.2017.04.001

Wisner, B., Blaikie, P., Cannon, T., Davies, I. (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters* (Second Edi). Routledge, London, UK and New York, NY.

World Bank. (2010). *Nepal: Pilot program for climate resilience (PPCR)*.

Xenarios, S., Nemes, A., Sarker, G. W., & Sekhar, N. U. (2016). Assessing vulnerability to climate change: Are communities in flood-prone areas in Bangladesh more vulnerable than those in drought-prone areas? *Water Resources and Rural Development*, *7*, 1–19. http://doi.org/10.1016/j.wrr.2015.11.001

Yin, R. K. (2009). *Case study reseach, design and method*. London: Sage publications Limited.

Zaw, T. N., & Lim, S. (2017). The military's role in disaster management and response during the 2015 Myanmar floods: A social network approach. *International Journal of Disaster Risk Reduction*. http://doi.org/http://dx.doi.org/10.1016/j.ijdrr.2017.06.023

Zuka, S. P. (2015). Prospects and challenges of local community adaptation to climate change in developing countries: The case study of Malawi. In *Handbook of Climate Change Adaptation* (pp. 1883–1898). http://doi.org/10.1007/978-3-642-38670-1_85

APPENDIX 1: HOUSEHOLD QUESTIONNAIRE

THE UNIVERSITY *of* EDINBURGH
School of Geosciences

Interview Consent Form

Research project title:

Research investigator:

Research assistant's name:

Research Participants name:

The interview will take (enter amount of time). We don't anticipate that there are any risks associated with your participation, but you have the right to stop the interview or withdraw from the research at any time.

Thank you for agreeing to be interviewed as part of the above research project. Ethical procedures for academic research undertaken from UK institutions require that interviewees explicitly agree to being interviewed and how the information contained in their interview will be used. This consent form is necessary for us to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation.

Quotation Agreement

I also understand that my words may be quoted directly. With regards to being quoted, please initial next to any of the statements that you agree with:

	I wish to review the notes, transcripts, or other data collected during the research pertaining to my participation.
	I agree to be quoted directly.
	I agree to be quoted directly if my name is not published and a made-up name (pseudonym) is used.
	I agree that the researchers may publish documents that contain quotations by me.

All or part of the content of your interview may be used;

- In academic papers, policy papers or news articles

- On our website and in other media that we may produce such as spoken presentations
- On other feedback events
- In an archive of the project as noted above

By accepting to take part in this interview;

1. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the interview at any time;
2. The transcribed interview or extracts from it may be used as described above;
3. I have understood what this research is all about
4. I don't expect to receive any benefit or payment for my participation;
5. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

Before I proceed? Are you giving me the consent to go ahead with the interview?

1. **Yes**
2. **No**

HOUSEHOLD CHARACTERISTICS

1. Questionnaire Number:

2. Enumerator's Code:

3. District Code:

4. Centre Code:

5. Date:

6. Checked: 1. Yes 2. No

HOUSEHOLD DEMOGRAPHIC DATA

7. Name	8. Sex	9. Marital Status	10. Relationship with Household head	11. Education Qualification/level	12. Occupation	13. Years of Stay	14. Age

Coding for Questions 6, 8, 9, 10, 11, 12, 14

8. Sex

Male

Female

9. Marital Status

Single (Never married)

Married (with one spouse)

Married (polygamous)

Widow/widower

Divorced/Separated

10. Relationship with household head

Head

Spouse

Son/daughter

Niece/Nephew

Grandson/daughter

Mother/Father

Grandmother/grandfather

Aunt/Uncle

11. Education Level

None

Preschool

Primary Standard 1-5

Primary Standard 6-8

Secondary Form 1-2

Secondary Form 3-4

Tertiary

12. Occupation

Farming

Fishing

Trade

Salary job/Employed

Others, specify

13. Years of Stay

8months to 1 year

1 – 3 years

4 – 5 years

More than 5 years

14. Age

18 – 25 years old

25 – 40 years old

40 – 55 Years old

Over 55 years old

15. If they migrated, why did they migrate to that area?

Ngati sinzika ya kumeneko, anasamukira kumeneko chifukwa chani?

……..

16. What are the main problems that you face as a household? Please list them all and rank them accordingly

1. Ndi mavuto anji amene mumakumana nawo pa banja panu/ pa moyo wanu?

2. Tchulani onse ndiponso muwasanje malingana ndi kukula kwa vutolo?

so, what do you do to cope with the problems you have? (list each problem and coping strategies)

Kodi mumathana nawo bwanji mavuto amenewa/ mumachepetsa bwanji mavuto amenewa?

How do you perceive your vulnerability to floods and droughts? Are you able to cope on your own, without external support? If yes, how? If not, why? (Please list everything that is mentioned properly and probe more)

Kodi mukuona kuti mumakhudzidwa bwanji ndi madzi osefukira kapenanso chilala/ng'amba?

	Madzi Osefukira	**Chilala/Ng'amba**
Palibe		
Pang'ono		
Kwambiri		

Mumatha kuzithandiza nokha nyengo imeneyi ikafika popanda thandizo lochokera kwa ena, mumatha kuzidalira nokha? Mumatani?

HOUSEHOLD INCOME LEVELS

17. What are your sources of income?

Mumapeza bwanji ndalama pakhomo panu?

Source of income	1. yes	2. No
Farming		
Fishing		
Trade		
Salary job/Employment		
Government Pension		
Others, specify		

18. What is your main source of income?

Chomwe mumadalira kwambiri kuti mupeze ndalama ndi chani pa zomwe mwatchulazo?

Farming

Fishing

Trade

Professional job

Others, specify

19. If there are school going children, what kind of academic institution do your children go to?

Ngati muli ndi ana opita ku school, amapita ku school yaboma kapena yolipira?

Public/Government

Private

None

20. How much do you pay school fees per term? (Ask how many terms they have)

Mumalipira ndalama zingati pa teremu (fees)? Ndipo ma tememuwo alipo angati?

Less than MK1000

Between MK1000-5000

Between MK 5000-10,000

Between MK10,000-20,000

More than MK20,000

21. What valuables do you have? (Please tick what they mention)

Muli ndi katundu wanji odalilika?

Valuable	1. Yes	2. No
Operational Mobile Phone		
Operational Radio		
Operational Television		
Operational Bicycle		

Operational Motor cycle		
Operational Car		
Livestock (Probe)		
Crops/ big farm (Probe)		
Ox cart (Ngolo)		

22. How much money do you get in a month?

Mumapeza ndalama zingati pa mwezi?

Less than MK5000

MK5,000 – 10,000

MK10,000 – 15,000

MK15,000 – 20,000

MK20,000-MK25,000

More than MK25,000

HOUSEHOLD EXPENDITURE PATTERN

23. Out of the money you get in a month, how much do you pay for;

Pa ndalama zomwe mumapezazo, mumagwiritsa nthito ndalama zingati pa mwezi?

Item	Amount
Water	
Electricity	
Phone	
Food	
Clothes	
Workers	
Groceries	

Farming	
House Rent	
Any investment (mention it)/ savings	
Others, specify	

Enumerator's Observation

24. What type of roof does the main house have?

Kodi denga la nyumba yawo anafolera ndi chani?

Grass thatched

Corrugated Iron Sheets

Other, specify…….

25. What type of walls does the main house have?

Khoma la nyumba yawo anamangira chani?

Burnt brick with plaster

Burnt brick without plaster

Sun dried bricks with plaster

Mud and poles

26. What type of floor does the main house have?

Pansi pa nyumba yawo anamangira chani?

Cement

Earth

ACCESS TO WATER SOURCES

27. What are your sources of water?

Madzi anu ogwiritsa ntchito mumawatenga kuti?

Borehole

Pipe

Spring

River

Lake

Protected well

Unprotected well

28. Where do you get water for the following uses:

Mumatenga kuti madzi ogwiritsira ntchito zili mmusizi?

A protected well is a well that has a cover that fully covers the hole while the unprotected well is the one that either do not have a cover or it is covered partially.

Use	Source
Potable (Drinking and Cooking) Okumwa ndi kuphikira	
Domestic (Washing, etc) Ochapira	
Water for farming Othirira	
Water for Livestock Aziweto	
Other (Specify)	

Borehole

Pipe

Spring

River

Lake

Protected well

Unprotected well

29. How far is it from your home?

Mumayenda mtunda waultali bwanji kuti mupeze madzi?

Less than 500m (O.5Km)

500m-1km

1 to 2km

3 to 5km

Over 5km

30. How much time do you spend when you want to collect water? (Thus how much time you spend going to the water source, collecting water and coming back home)

Mumatenga nthawi yochuluka bwanji mukapita ku madzi?

Less than 15 minutes

15 – 30 Minutes

30 -45 minutes

45minutes to 1 hour

More than 1 hour

ACCESS TO ENERGY SOURCES

31. What type of energy do you usually use for the following?

Use	Source
Cooking **Mumaphikira chani?**	
Lighting **Mumawunikira chani?**	

32. How long does it take you to fetch firewood? Have there been any changes recently? Why?

1. Mumatenga nthawi yayitali bwanji mukapita ku nkhuni?

2. Zaka zambuyomu mumatenga nthawi chimodzimodzi, yafanana kapena yasiyana?

3. Ngati zasintha, nchifukwa chani?

33. What is your main type of food? How many meals do you have in a day? Do you have enough food throughout the year? Have there been any changes in the way you eat or produce in your fields? If yes, why?

1. Chakudya chomwe mumachidalira ndi chani?

2. Mumadya kangati pa tsiku?

3. Mumakhala ndi chakudya chokwanira chaka chonse?

4. Pakhala kusintha kunkhani ya madyedwe anu?

5. Nanga zokolola zanu kumunda, mukumakolola chimodzimodzi kapena zasintha?

6. Ngati zasintha, nchifukwa chani zasintha?

34. What happens during disaster situations? Who do you consult first? Why? Who makes decisions at household level? Why?

1. Kukagwa za zizizi monga madzi osefukira kapena chilala mumakamufikira ndani kapena kuti mumakamudandaulira ndani?

2. Nchifukwa chani mumapita kwa amenewo?

3. Amene amapanga chiganizo chimenecho pa banja panu ndani?

4. Chifukwa chani amapanga maganizo iwowo?

35. At what point do you get help from members outside you're the family/household? What kind of support do you expect from them? Are there any reasons behind this? Explain?

1. Zikavuta, ndi nthawi iti imene mumalandira thandizo kwa anthu ena ozungulira?

2. Ndi thandizo lanji limene mumayembekezera kucholera kwa anthu amenewa?

3. Nchifukwa chani mumayembekezera thandizo la mtundu umenewu?

36. Has there been a change in the way you do your farming? If yes? Since when did you change? What motivated you to change? Where did you learn the skill to do it differently? What is the difference now? In the next few years, do you see yourself doing things the way you are doing now? Why?

1. Kodi pali kusintha kunkhani yamalimidwe anu?

2. Ngati pali kusintha, kuyambira liti?

3. Chinapangitsa ndi chani kuti musinthe kalimidwe?

4. Munaphunzira kuti z aka limidwe kakusinthaku?

5. Chinasintha ndi chani panopa kunkhani ya zokolola?

6. Mukuona ngati chkupangitsa ndi chani kuti zisinthe?

37. How do you store your produce after harvesting? Have there been any changes? Why?

1. Mumasunga bwanji zokolola zanu?

2. Pakhala kusintha panopa ndi momwe mumasungira zokolola zanu muyomu?

3. Ngati pali kusintha, nchifukwa chani pali kusintha?

38. Is the quality of the produce affecte during storage? How and why?

1. Kodi zokolola zanu zimaonongeka mukazisunga momwe mumasungamo?

2. Ngati zimaonongeka, chimachitika ndi chani?

3. Nchifukwa chani zimaonongeka?

DEVELOPMENT PROJECTS

39. Are there any development projects in your area?

Kodi mumalandira zitukuko kudera kwanu?

Yes

No

40. What type of development projects are there?

Kodi mumalandira zitukuko zanji kudera kwanu?

Irrigation

Agriculture

Water

Sanitation

Water and sanitation

Health

Others, specify

41. Do you participate in any of the development projects?

Mumatengapo gawo ku nkhani za chitukuko zomwe mumalandirazo?

Yes

No

Which ones do you participate in, please specify and why, what motivates you to take part in such projects only?

Mumatenga gawo ku zitukuko zanji?

Nchifukwa chani kapena kuti chimakupangitsani ndi chani kuti muzitenga nawo gawo ku zitukuko zimenezi?

…….

42. What kind of activities are you involved in, and why?

1. Nangano ku nkhani ya zochitika za mmudzi, Mumatenga nawo mbali yanji mu zochitika za mmudzi?

Clearing roads

Building houses

Moulding Bricks

Group farming

Others, specify…….

2.Chifukwa chani mumatengapo gawo ku zochitika za mmudzizi?

43. Do you have any development committees in your area?

Muli ndi ma komiti a zachitukuko ku dera lanu?

Yes

No

If yes, would you say they are active?

Ngati alipo ma komitiwo, kodi amagwira ntchito bwino?

Yes

No

Please give a reason for your answer

Chifukwa chani mwayankha chonchi?

……..

Please mention the names of the development committees

Thulani mayina a ma komiti a chitukuko a mudera lanuli?

Area and Village Development Committees

Civil protection committees

Natural resources and management committees

Others (List them all)

44. What kind of extension messages and services do you get from government workers, civil society organisations and non-governmental organisations? (Tick all that has been mentioned, and rank accordingly)

Mumamva uthenga okhuza chani kuchokera kwa alangizi?

a. Agriculture

b. Health

c. Gender

d. Community development

e. Forest and Environment

f. Others (Mention them)

45. What is your opinion regarding extreme weather events, (floods, droughts and strong winds?

Maganizo anu ndi otani pa nkhani wa kusefukira kwa madzi, chilala ndi mphepo yamkuto/yoononga?

46. How can farmers become more resilient to (cope with) floods and droughts?

Kodi alimi angapange bwanji kuti asamakhuzidwe moyipa kwambiri ndi kusefukira kwa madzi kapena chilala ndi mphepo zoononga?

47. In your opinion, what do you think are some of the major challenges that are preventing farmers from becoming resilient to floods and droughts?

Mungandiuzeko zifukwa zazikulu zingapo zomwe zikukanikitsa alimi kuti akhale ozidalira okha akagweredwa mavuto a madzi osefukira ndi chilala.

48. What do you think the government and other development partners should do to assist farmers to be more resilient to extreme whether events?

Mukuona kuti boma ndi mabungwe akhonza kuthandiza bwanji kuti alimi asamakhuzidwe kwambiri ndi nyengo zomwe tatchulazi.

APPENDIX 2 FOCUS GROUP DISCUSSION GUIDE

District:

Traditional Authority:

Group Village Headman:

Village:

Number of participants:

Access to water: Distance, source, how long it takes to draw potable water, availability, quality

Kodi madzi mumawatunga kuti?
Mumatenga nthawi yayitali bwanji mukapita ku madzi kuti mubwere?
Madzi ake amakhala abwino?

Access to firewood: Distance, source, availability

Kodi nkhuni zanu mumatola kuti?
Ndi kutali bwanji?
Zikumapezeka ngati kale, ngati zasintha, chasintha ndi chani?

General livelihood and source of income:

Kodi mumapanga chani kuti mukhale ndi ndalama, zakudya komanso mupez zofunikira pakhomo?

What are the problems that you face in this community?

Kodi mumakumana ndi mavuto anji kumudzi kwanu?

External perception to vulnerability:

Kodi anthu amaona ngati mumakhuzidwa bwanji ndi mavuto anuwa?

Self-perceived vulnerability

Nanga inu ini ake, mumaona kuti ndinuokhudziwa bwanji ndi mavuto amenewa?

Risk ranking:

Pa muli pa chiopsyezo chotani kudera kwanu?
Mungazisanje ziopsyezo zanuzo malingana ndi kuopsya kwake?

Topography, geographical setting/position

Kodi malo omwe mumakhalawa ndi otani, mungawafotokeze bwanji?

Cultural issues: Proportion of men to women? Matrilineal or patrilineal? Gender roles and perspectives,

Ku nkhani za chikhalidwe, kodi ambiri ndi azimayi kapena azibambo?
Mumapanga chikamwini kapena mumaloola?
Kodi azimayi ndi azimbambo maudindo awo amakhala ofana kapena amasiyana?
Ngati amasiyana, amasiyana potani, azimayi amatani, nanga azibambo amatani?
Nanga kunkhani yopanga ziganizo zazikulu pakhomo, zimakhala bwanji?

Myths and beliefs relating to changes in weather patterns and extreme weather events

Ndi zikhulupilirp ziti zomwe muli nazo pa zakusintha kwa nyengo

how do you understand the issues of drought and floods? What influences them? How do they get reduced? What are the effects? Can you differentiate the droughts and effects as well as the floods and the effects?

Mumaziwa zotani za chilala komamso ng'amba? Chimayambisa ndi chiyani? Amachepesedwa bwanji? Zovuta zake ndi zotani? Mungasiyanise zovuta zomwe zimaza Kamba ka chilala komanso madzi osefukira

If you were to weight the risks associated with the floods and droughts, which ones are high risks? Can you rank them according to their associated risk?

Kodi pakati pa madzi osefukila ndi chilala chowopsa kwambiri ndi chani pa zinthu ziwiri zimeneziz

How do you deal with the effects of the floods and or droughts? Who decides what to do? Who do you consult? Where do you get knowledge from what assumptions do you make when deciding who to consult first and what to do

Mumapanga zotani mukakumana ndi mavuto okugwa mwazizizi (madzi osefukira,chilala)

Ndindani yemwe amapanga chiganizo? Mumafikira ndani mukagwa mmavutowa, mumakhala ndi chiyembekezo chanji mukamawauza anthu amenewa?

What do you think are the factors that make some people more vulnerable than others? What factors exacerbates their vulnerability?

Kodi muganizira kuti ndi zinthu ziti zomwe zimapangitsa kuti anthu ena azikhuzidwa kwambiri ndi madzi osefukira kapena chilala kuposa ena, zimawapangitsa kukhala pachiopsyezo kwambiri ndi chani?

WHAT do you think are some factors that make some vulnerable people not to deal with their vulnerability? How can these be motivated to start taking action?

Nanga chimapangitsa ndi chani kuti anthu okhala pa chiopsyezo kwambiri asamatengepo mbali yochepetsa mavuto awo ndi chani?

Ndi zinthu ziti zingawapangitse anthu amenewa kuti azikhala ozidalira paokha, kuzihandiza kuti asamavutike kwambiri?

What really motivates people that take action against vulnerability to floods and droughts to be taking action?

Kodi chimawapangitsa anthu oti amakhudzidwa ndi madzi osefukira kapena chilala kutengapo mbali paokha kuti asamavutike kwambiri ndi chani?

In your opinion, is there any link between self-perceived vulnerability and taking action to reduce vulnerability? If so, what is the link?

Kodi pali kulumikizana kuli konse pakati pa momwe munthu amaziganizirira kuti ndiovutika bwanji ndi kuti azitengapo mbali pa kuchepetsa mavuto omwe akukumana nawo paokha?

Ngati pali kulumikizana, kulumikizana kwake nkotani?

Are some geographical factors that that you think make you more vulnerable to floods and droughts than others?

Kodi pali malo ena ndi zozungulira zawo zomwe zimapangitsa kuti anthu ena azivutika kwambiri ndi madzi osefukira kapena chilala kuposa ena? Malo akewo amakhala otani?

Are there some geographical factors that enhance your resilience to the flood and drought?

Kodi pali malo ena ndi zozungulira zawo zomwe zimapangitsa kuti anthu ena asamavutike kwambiri, kapena azitha kuzidalira paokha akakumana ndi madzi osefukira kapena chilala kuposa ena? Malo akewo amakhala otani?

What are some of the social and cultural factors that contribute to your vulnerability to floods and drought?

Kodi pali zinthu zanji zokhudzana zachikhalidwe cha anthu zomwe zimapangitsa kuti anthu ena azivutika ndi madzi osefukira kapena chilala kuposa anzawo?

What are some of the social and cultural factors that contribute to your resilience to floods and drought?

Kodi pali zinthu zanji zokhudzana zachikhalidwe cha anthu zomwe zimapangitsa kuti anthu ena asamavutike kwambiri kapena azitha kuzidalira paokha akakumana ndi madzi osefukira kapena chilala kuposa anzawo?

What environmental changes have you experienced within the past 5 to 10 Years? Is there any difference in the way you used to grow crops and handle crops after harvesting? What are the differences? Where did you obtain the skills?

Mukuona kwanu nyengo yasintha bwanji muzaka zisanu komanso khumi zapitazi? Pali kusintha kulikonse mu zokolola zanu komanso kasungidwe ka zokolola? Zikusiyana bwanji? munatenga kuti njira zasopanozi?

In the next few years, do you see yourselves doing things the way you are doing now, things like livelihood options, farming and post-harvest handling? Why?

Muzaka zakusogolo mukuziona mukupanga chimozimozi ndi momwe mukupangira pano? Kakololedwe ka zakumunda komanso kasamalidwe ka zokolola?

do you have any development projects in the area? Do you all participate? Why and why not?

Pali ntchito zachitukuko zomwe zikuchitika mu dera lanu? Nonse mumatenga nawo mbali? Ngati mumatenga nawo mbali ndi chifukwa chiyani? Ngati simutenga nawo mbali ndi chifukwa chiyani simutenga nawo mbali?

Do you have development committees in the area? How do you rate them in terms of efficiency? Please rank them accordingly.

Ku dela lanu kuli magulu oyang'anira zachitukuko? Mungawalongosole bwanji mu kagwiridwe kawo ka ntchito? Mulongosole motengera ndi momwe amagwirila ntchito

Do you have active extension workers in your area? Who are more effective than others and why?

Muli ndi alangizi mu dela lanu? Ndi alangizi ati omwe amagwira ntchito modalilika? Inu mukuganiza kuti chifukwa chian amagwira ntchito motero?

Do you attend development meetings and trainings? Which ones do you like attending and taking part in? Why?

Mumatenga nawo mbali mmagulu azachitukuko? Ndi magulu ati amene mumatenga mbali? Mchifukwa chiyani mumatenga nawo mbali?

In terms of resilience to floods and or droughts, which strategies do you think are more sustainable than others, why? Which ones are less sustainable and why?

General Livelihood, Crop Production and Post-Harvest Handling

What is your main type of food? How many meals do you have in a day? Do you have enough food throughout the year? Have there been any changes in the way you eat or produce in your fields? If yes, why?

1. **Chakudya chomwe mumachidalira ndi chani?**
2. **Mumadya kangati pa tsiku?**
3. **Mumakhala ndi chakudya chokwanira chaka chonse?**
4. **Pakhala kusintha kunkhani ya madyedwe anu?**
5. **Nanga zokolola zanu kumunda, mukumakolola chimodzimodzi kapena zasintha?**
6. **Ngati zasintha, nchifukwa chani zasintha?**

What happens during disaster situations? Who do you consult first? Why? Who makes decisions at household level? Why?

Kukagwa za zizizi monga madzi osefukira kapena chilala mumakamufikira ndani kapena kuti mumakamudandaulira ndani?
2. Nchifukwa chani mumapita kwa amenewo?
3. Amene amapanga chiganizo chimenecho pa banja panu ndani?
4. Chifukwa chani amapanga maganizo iwowo?

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4. Munaphunzira kuti z aka limidwe kakusinthaku?
5. kodi mukuona kuti zaka zikubwerazi mukhala mukupanga chimozimozi ndi mmene mukupangira pano?
6. chifukwa chiyani?

APPENDIX 3 KEY INFORMANT INTERVIEW GUIDE

District:

Traditional Authority:

Group Village Headman:

Village:

Access to water: Distance, source, how long it takes to draw potable water, availability, quality

Kodi madzi mumawatunga kuti?
Mumatenga nthawi yayitali bwanji mukapita ku madzi kuti mubwere?
Madzi ake amakhala abwino?

Access to firewood: Distance, source, availability

Kodi nkhuni zanu mumatola kuti?
Ndi kutali bwanji?
Zikumapezeka ngati kale, ngati zasintha, chasintha ndi chani?

General livelihood and source of income:

Kodi mumapanga chani kuti mukhale ndi ndalama, zakudya komanso mupez zofunikira pakhomo?

What are the problems that you face in this community?

Kodi mumakumana ndi mavuto anji kumudzi kwanu?

External perception to vulnerability:

Kodi anthu amaona ngati mumakhuzidwa bwanji ndi mavuto anuwa?

Self-perceived vulnerability

Nanga inu ini ake, mumaona kuti ndinuokhudziwa bwanji ndi mavuto amenewa?

Risk ranking:

Pa muli pa chiopsyezo chotani kudera kwanu?
Mungazisanje ziopsyezo zanuzo malingana ndi kuopsya kwake?

Topography, geographical setting/position

Kodi malo omwe mumakhalawa ndi otani, mungawafotokeze bwanji?

Cultural issues: Proportion of men to women? Matrilineal or patrilineal? Gender roles and perspectives,

Ku nkhani za chikhalidwe, kodi ambiri ndi azimayi kapena azibambo?
Mumapanga chikamwini kapena mumaloola?
Kodi azimayi ndi azimbambo maudindo awo amakhala ofana kapena amasiyana?
Ngati amasiyana, amasiyana potani, azimayi amatani, nanga azibambo amatani?
Nanga kunkhani yopanga ziganizo zazikulu pakhomo, zimakhala bwanji?

Myths and beliefs relating to changes in weather patterns and extreme weather events

Ndi zikhulupilirp ziti zomwe muli nazo pa zakusintha kwa nyengo

how do you understand the issues of drought and floods? What influences them? How do they get reduced? What are the effects? Can you differentiate the droughts and effects as well as the floods and the effects?

Mumaziwa zotani za chilala komamso ng'amba? Chimayambisa ndi chiyani? Amachepesedwa bwanji? Zovuta zake ndi zotani? Mungasiyanise zovuta zomwe zimaza Kamba ka chilala komanso madzi osefukira

If you were to weight the risks associated with the floods and droughts, which ones are high risks? Can you rank them according to their associated risk?

Kodi pakati pa madzi osefukila ndi chilala chowopsa kwambiri ndi chani pa zinthu ziwiri zimeneziz

How do you deal with the effects of the floods and or droughts? Who decides what to do? Who do you consult? Where do you get knowledge from what assumptions do you make when deciding who to consult first and what to do

Mumapanga zotani mukakumana ndi mavuto okugwa mwazizizi (madzi osefukira,chilala)

Ndindani yemwe amapanga chiganizo? Mumafikira ndani mukagwa mmavutowa, mumakhala ndi chiyembekezo chanji mukamawauza anthu amenewa?

What do you think are the factors that make some people more vulnerable than others? What factors exacerbates their vulnerability?

Kodi muganizira kuti ndi zinthu ziti zomwe zimapangitsa kuti anthu ena azikhuzidwa kwambiri ndi madzi osefukira kapena chilala kuposa ena, zimawapangitsa kukhala pachiopsyezo kwambiri ndi chani?

WHAT do you think are some factors that make some vulnerable people not to deal with their vulnerability? How can these be motivated to start taking action?

Nanga chimapangitsa ndi chani kuti anthu okhala pa chiopsyezo kwambiri asamatengepo mbali yochepetsa mavuto awo ndi chani?

Ndi zinthu ziti zingawapangitse anthu amenewa kuti azikhala ozidalira paokha, kuzihandiza kuti asamavutike kwambiri?

What really motivates people that take action against vulnerability to floods and droughts to be taking action?

Kodi chimawapangitsa anthu oti amakhudzidwa ndi madzi osefukira kapena chilala kutengapo mbali paokha kuti asamavutike kwambiri ndi chani?

In your opinion, is there any link between self-perceived vulnerability and taking action to reduce vulnerability? If so, what is the link?

Kodi pali kulumikizana kuli konse pakati pa momwe munthu amaziganizirira kuti ndiovutika bwanji ndi kuti azitengapo mbali pa kuchepetsa mavuto omwe akukumana nawo paokha?

Ngati pali kulumikizana, kulumikizana kwake nkotani?

Are some geographical factors that that you think make you more vulnerable to floods and droughts than others?

Kodi pali malo ena ndi zozungulira zawo zomwe zimapangitsa kuti anthu ena azivutika kwambiri ndi madzi osefukira kapena chilala kuposa ena? Malo akewo amakhala otani?

Are there some geographical factors that enhance your resilience to the flood and drought?

Kodi pali malo ena ndi zozungulira zawo zomwe zimapangitsa kuti anthu ena asamavutike kwambiri, kapena azitha kuzidalira paokha akakumana ndi madzi osefukira kapena chilala kuposa ena? Malo akewo amakhala otani?

What are some of the social and cultural factors that contribute to your vulnerability to floods and drought?

Kodi pali zinthu zanji zokhudzana zachikhalidwe cha anthu zomwe zimapangitsa kuti anthu ena azivutika ndi madzi osefukira kapena chilala kuposa anzawo?

What are some of the social and cultural factors that contribute to your resilience to floods and drought?

Kodi pali zinthu zanji zokhudzana zachikhalidwe cha anthu zomwe zimapangitsa kuti anthu ena asamavutike kwambiri kapena azitha kuzidalira paokha akakumana ndi madzi osefukira kapena chilala kuposa anzawo?

What environmental changes have you experienced within the past 5 to 10 Years? Is there any difference in the way you used to grow crops and handle crops after harvesting? What are the differences? Where did you obtain the skills?

Mukuona kwanu nyengo yasintha bwanji muzaka zisanu komanso khumi zapitazi? Pali kusintha kulikonse mu zokolola zanu komanso kasungidwe ka zokolola? Zikusiyana bwanji? munatenga kuti njira zasopanozi?

In the next few years, do you see yourselves doing things the way you are doing now, things like livelihood options, farming and post-harvest handling? Why?

Muzaka zakusogolo mukuziona mukupanga chimozimozi ndi momwe mukupangira pano? Kakololedwe ka zakumunda komanso kasamalidwe ka zokolola?

do you have any development projects in the area? Do you all participate? Why and why not?

Pali ntchito zachitukuko zomwe zikuchitika mu dera lanu? Nonse mumatenga nawo mbali? Ngati mumatenga nawo mbali ndi chifukwa chiyani? Ngati simutenga nawo mbali ndi chifukwa chiyani simutenga nawo mbali?

Do you have development committees in the area? How do you rate them in terms of efficiency? Please rank them accordingly.

Ku dela lanu kuli magulu oyang'anira zachitukuko? Mungawalongosole bwanji mu kagwiridwe kawo ka ntchito? Mulongosole motengera ndi momwe amagwirila ntchito

Do you have active extension workers in your area? Who are more effective than others and why?

Muli ndi alangizi mu dela lanu? Ndi alangizi ati omwe amagwira ntchito modalilika? Inu mukuganiza kuti chifukwa chian amagwira ntchito motero?

Do you attend development meetings and trainings? Which ones do you like attending and taking part in? Why?

Mumatenga nawo mbali mmagulu azachitukuko? Ndi magulu ati amene mumatenga mbali? Mchifukwa chiyani mumatenga nawo mbali?

In terms of resilience to floods and or droughts, which strategies do you think are more sustainable than others, why? Which ones are less sustainable and why?

General Livelihood, Crop Production and Post-Harvest Handling

What is your main type of food? How many meals do you have in a day? Do you have enough food throughout the year? Have there been any changes in the way you eat or produce in your fields? If yes, why?

1. **Chakudya chomwe mumachidalira ndi chani?**
2. **Mumadya kangati pa tsiku?**
3. **Mumakhala ndi chakudya chokwanira chaka chonse?**
4. **Pakhala kusintha kunkhani ya madyedwe anu?**
5. **Nanga zokolola zanu kumunda, mukumakolola chimodzimodzi kapena zasintha?**
6. **Ngati zasintha, nchifukwa chani zasintha?**

What happens during disaster situations? Who do you consult first? Why? Who makes decisions at household level? Why?

Kukagwa za zizizi monga madzi osefukira kapena chilala mumakamufikira ndani kapena kuti mumakamudandaulira ndani?
2. Nchifukwa chani mumapita kwa amenewo?
3. Amene amapanga chiganizo chimenecho pa banja panu ndani?
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