RATIONALITIES OF COMMUNITY-BASED ADAPTATION STRATEGIES TO URBAN FLOODING IN MISISI INFORMAL SETTLEMENT IN LUSAKA, ZAMBIA

BY

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A Dissertation submitted to the University of Zambia as a partial fulfillment of the requirements for the award of a Master of Science in Spatial Planning Degree.

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DECLARATION

I, **Collins Milupi,** hereby declare that this dissertation is my original work. It has never been submitted wholly or in part at this university or any other university for the award of any academic qualification. All materials, which were incorporated from other sources that are either published or unpublished, were properly acknowledged by means of complete references. I therefore present this dissertation for examination for the award of a Master of Science in Spatial Planning Degree to the University of Zambia.

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CERTIFICATE OF APPROVAL

This dissertation has been approved as fulfilling the requirements for the award of Master of Science in Spatial Planning by the University of Zambia.

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Date of Approval

DEDICATION

I dedicate this dissertation to the Almighty God for giving me strength, wisdom and good health throughout my journey in pursuit of this dissertation. In addition, I dedicate this dissertation to my late young brother Michael Milupi Jr. and family for their continuous support and encouragement rendered to me.

ABSTRACT

This abstract is based on a study carried out in Misisi; an informal settlement in the city of Lusaka. The settlement experiences perennial floods. However, despite the frequency and devasting effects of flooding in the area, people continue to live in the settlement. In much of urban Africa, adaptation to settlement flooding has been community-driven based on lived experiences and the use of local resources and rudimental technologies. However, there has been a contested debate regarding the value of local knowledge and experience in disaster risk reduction for a wholesome flood adaptation response in African cities. Often viewed as 'backwards', governments instead based on foreign ideas have emphasized 'advanced' alien technologically sophisticated and economically expensive approaches which are often non-consultative and alien to local living conditions. This study sought to examine the rationalities that influence the implementation of community-based adaptation strategies to mitigate flooding in Misisi. The aim was achieved by the following objectives: To investigate the role of community governance systems for flood adaptation, to spatially map flood risk areas using community and experiential knowledge, to identify community-driven adaptation strategies and to examine instances of differences between community and state approaches to urban flood risk mitigation in Misisi. The study used a case study research approach. It was designed as a descriptive and interpretive inquiry analysed through a mixed methods approach. The study was based on data purposively collected from 65 households and supplemented by 3 key informants from state institutions with a stake in flood management and mitigation in the settlement. Key methods employed in collecting empirical evidence included semi-structured interviews with flood-affected households, in-depth interviews with ward leaders, and state officials and mapping of zones by the severity of flooding. Non-participant observation, primarily taking photographs, complemented these methods. Data was analysed through descriptive statistics, content and narrative analysis. Spatial data were analysed using spatial modelling in GIS. Findings show that the area Councillor, Ward Development Committee (WDC) and Zone Representatives make up the main governance structure in Misisi which are responsible for organising the community to build community-based flood resilience systems. The study identified two flooding zones namely low and highly flooded based on geospatial modelling and the frequency of occurrence of urban flooding in the area. From a total of 4,965 houses in Misisi, 64% of the houses fall in low flood risks areas, while 36% fall in high-risk areas. The community has employed structural and non-structure measures to adapt to floods. The most common adaptation strategies used are the use of sandbags which are placed around their houses; raised pit latrines and doorsteps; construction of embankments, small drainages, protection walls and elevation of house foundations and seasonal temporal displacement. The research findings also revealed that there is a lack of acceptance by the local government of local people's knowledge and their response to floods. This has resulted in conflicting rationalities between state-led approaches and the community. The conclusion emphasises the need for more attention to flood risk reduction and to working with low-income communities to design flood risk reduction interventions that align closely with the priorities of local communities.

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List of Acronyms

CBA ……Community Based Adaptations

CBD …….Central Business District

CSO …… …….Central Statistics Office

DCPCC …… District Civil Protection Coordinating Committee

DMMU …….Disaster Management and Mitigation Unit

DMS ……..Disaster Management System

GIS ……Geographical Information System

GPS ……...Global Positioning System

GRZ ……...Government of the Republic of Zambia

ITCZ ……...Inter-Tropical Convergence Zone

JCTR ……...Jesuit Centre for Theological Reflection

JICA …….Japan International Cooperation Agency

LCC …….Lusaka City Council

NDMP …….National Disaster Management Policy

NDP …….National Development Plan

NGOs ……...Non-Governmental Organisations

PHA ……..Public Health Act

SPSS …….Scientific Package for Social Sciences

WDCs ……..Ward Development Committees

UN ……United Nations

CHAPTER ONE: INTRODUCTION

1.0 Overview

This chapter provides the overall introduction of this research project. It presents the nature of the study by bringing out the basis for the entire dissertation. The chapter is divided into seven sections: in section one, I provide the background to the research. I use section two to present the research problem. Using section three, I provide the aim of the study. I further use sections four and five to provide for the research objectives and questions respectively. In section six, I present the significance of the research by explaining the nature and potential use of the research product. I use section seven to conclude this chapter and to state the outline of the entire dissertation.

1.1 Background

Africa is experiencing the highest rate of unplanned urbanisation, urbanisation of poverty, low infrastructure capacity and increased climate uncertainty (UN-Habitat, 2014). These challenges have increased the vulnerability of poor urban communities to natural hazards, undermining urban resilience particularly in slums (Williams et al., 2019). Current statistics indicate that more than half of the world's population lives in cities and by 2050, the global level of urbanisation is predicted to rise to 68% (United Nations Department of Economic and Social Affairs, 2018). The rapid growth of cities places pressure on the state and civil society organisations to provide adequate and affordable shelter and services for the urban poor (Williams et al., 2019). In Sub-Saharan Africa, most cities have a large proportion of their population in informal settlements, which developed outside the control of the authorities charged with the regulation of land uses and building construction (Nchito, 2007). An increasing disastrous phenomenon that is occurring in informal settlements is urban flooding (Douglas et al., 2008). As all flooding, urban flooding can lead to several losses for the individual such as loss of properties, damage to houses and financial stress for the affected persons (Parkinson, 2003) and an increased risk of suffering from infectious waterborne diseases (Olurunfemi, 2011). Flooding is one of the major factors that prevent Africa's growing population of city dwellers from escaping poverty and stands in the way of the UN 2020 goal of achieving 'significant improvement' in the lives of urban slum dwellers (ActionAid, 2006).

Zambia is one of the countries that is most affected by flooding in Southern Africa to an extent that flooding has over the years caused an unusual level of damage in several parts of the country. These floods undesirably impacted food and water security, water quality, energy and the sustainable livelihoods of both urban and rural communities (Ministry of Tourism, Environment and Natural Resources, 2007). In Lusaka, flood disaster is not a recent phenomenon, the City has experienced floods in the past years during the rainy season, and this problem of flooding has become a chronic problem leading to both environmental and socio-economic challenges (Nchito, 2007). Informal settlements are the most affected by urban floods as they are usually located in fragile environments and are underserviced; as such they are prone to flooding during the rainy season (Fourth World Water Forum, 2006). According to Chisolo (2012) the limitation in accessing land has created problems as people cannot own land; hence they have no alternative but to crowd themselves in small areas that are not designated for occupation. Lusaka city has more than 43 unplanned settlements, which are a legacy of inadequate land delivery systems for the poor, and some date back to pre-independence times when the capital had fewer people (Nchito, 2007). The unplanned settlements in Lusaka are usually located on low-lying flat land, as such; they are prone to flooding during the rainy season (Fourth World Water Forum, 2006). Misisi settlement is one of these unplanned settlements in Lusaka.

Thus, given that global climate change is now a scientific and policy reality and a significant driver of urban change in African cities (Besada and Sewankambo, 2009), adaptation and measures that effectively address flooding become a matter of important settlement intervention policy for the city and municipal governments (Mudenda, 2010; Lebel et al., 2012). Urban populations in African cities experience flooding on a perennial basis and have since developed ways of adapting (Amoako, 2012; Quandt and Kimathi, 2016). People have adapted their livelihoods to changing situations in the past, are actively engaged in this presently, and will continue to adapt in the future (Matthews and Sydneysmith, 2010). Many members of informal communities in African cities have deep stories and narratives about how they experience, cope and have adapted to flooding without much external support from the government, civil society and/or external funders. However, governments working with various external actors have a long history of intervening in informal settlements to reduce social and climate change vulnerabilities.

Thus, in most cases, including Misisi, climate change adaptation interventions tend to be a mix of both top-down state-led and bottom-up community-led adaptation efforts. It is against this background that this study sought to examine the rationalities that influence the implementation of community-based adaptation strategies to flooding in Misisi.

1.2 Problem Statement

In much of urban Africa, adaptation to settlement flooding has been community-driven based on community-based learning, communal and individual programmes and instances of actions that are based on lived experiences and use of local resources and rudimental technologies. However, few studies exist that document the role of lived experiences, community-driven actions and community leadership as essential enablers for flood adaptation in African cities. For instance, Misisi is prone to floods almost every rainy season but despite this, people have continued to live in the area and seem to have adapted to perennial floods. In most informal settlements in Lusaka, community-led climate change adaptation efforts are pronounced but are not fully factored in state-led efforts to upgrade informal communities and build urban resilience to flooding. On the other hand, based on Global North ideas, most state interventions usually impose settlement interventions and give little attention to community-based adaptation strategies (Watson, 2003; de Stage & Watson, 2018). This approach to resilience building in slums has resulted in marked differences between state and community efforts and a clash of rationalities. The positive impact of both state and community actors have been limited by differences in approach. The critical analysis of the differences in state and community rationalities presents an important knowledge gap. Further, a nuanced analysis of 'lived experiences', community governance and everyday urbanisms in climate change adaptation science remain a crucial gap in urban climate change interventions. With increasing efforts by various stakeholders to ensure urban resilience to climate shocks in Lusaka, there is a need to better understand community-based urban adaptation practices and approaches.

1.3 Aim of the Study

The study is aimed at examining the rationalities that influence the implementation of community-based adaptation strategies to flooding in Misisi.

1.4 Research Objectives

1. To investigate the role of community governance structures in flood adaptation in Misisi.
2. To spatially identify flood risk areas in Misisi using community knowledge.
3. To identify community-driven adaptation strategies to mitigate flood risk in Misisi.
4. To critically examine instances of differences between community and state approaches to urban flood risk mitigation in Misisi.

1.5 Research Questions

1. What is the role of community governance structures in facilitating adaptation to urban flooding in Misisi?
2. Which parts of the study area are most prone to flood hazards?
3. What are the adaptation strategies developed by community actors to mitigate floods in Misisi?
4. What is the role of professional and experiential knowledge in urban flood mitigation in Lusaka?
5. What differences (conflicts), have risen with the community to state approaches to urban floods in Misisi?

1.6 Rationale of the Study

This study is focused on identifying the community's urban flood adaptation mechanisms and the role of professional and experiential knowledge in urban flood mitigation in Misisi in particular and Lusaka in general. The knowledge of these existing adapting capacities for disaster risk reduction can help to strengthen local government planning strategies for adaptation to climate change and the building of flood resilience in cities, as they draw on existing grassroots adaptation and governance mechanisms. The findings may also help in generating concepts and ideas on lived experiences and community governance aspects in climate change adaptation sciences to help benefit local communities who are affected by flood disasters.

1.7 Structure of the Dissertation

This dissertation is structured by seven interlinked chapters. Chapter one has presented the background, research problem, objectives and significance of the research. Chapter 2 evaluates relevant literature by identifying key debates and notable gaps in the literature. The chapter

further looks at the institutional arrangement and legal frameworks in terms of the regulations and policies guiding disaster management and mitigation in Zambia. The third chapter presents a description of the study area and provides reasons why the study area was selected. The research strategy and research methods are discussed and justified in the fourth chapter. In this chapter, the study explains and justifies the use of the case study method and why it is most appropriate to answer the research questions. The study further discusses the various primary and secondary data collection methods used. It also presents measures that were implemented during the research process to ensure the internal and external validity of research outcomes. The fifth chapter reports the empirical findings of the research, thus the study addressed the '*what'* question of the research. While drawing on all the previous chapters, It used chapter six for interpretation of the findings which are presented according to the research questions thus, It addressed the inherent '*how'* and '*why'* research questions of the study. Finally, chapter seven provides overall reflections and conclusions on the research. It also proposes future directions on mitigating and management of disasters to build resilience.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature relevant to the concept of community-based adaptation and governance for enhancing the adaptive capacity of informal settlements to urban flooding in the Global South. The chapter provides the concepts and theoretical debates which in turn have been used in the findings chapter to interpret and analyse the empirical data and generate meaning. It consists of nine sections. The first section explains the nature of global South cities in relation to climate change vulnerability. The second section explains the importance of community governance systems in informal settlements. The third looks at community experiential knowledge in disaster risk reduction. The fourth section looks at participatory mapping as an alternative to traditional top-down forms of community mapping. The fifth section looks at state and community approaches to urban flooding. The sixth and seventh sections, look at concepts of urban resilience and participatory slum upgrading respectively. The eighth section looks at policy and legal frameworks applicable to flood risk management. Finally, in the ninth section, a conclusion is presented.

2.1 Nature of Global South Cities Vis-À-Vis Climate Change Vulnerability

Global South cities are particularly vulnerable to challenges of population growth and climate change. Their population is expected to grow to 1.7 billion inhabitants in 2050 and most of these people will be in urban areas and informal settlements (Stephenson et al., 2010; Baker, 2012). One of the greatest challenges for climate change adaptation is how to build resilience for the billion urban dwellers that are estimated to live in what are termed informal settlements (Dodman, et al., 2019). The persistent rise in informal settlements is one of the major consequences of urbanisation and population growth that is most prominent in developing countries (Jones, 2017). Apart from the impacts of rapid urbanisation and population growth in cities of developing countries, governments are also to blame for the rise of informal settlements, particularly at the city level as they often fail to effectively link the trajectory of economic development to the effects of urban growth (Ooi and Phua, 2007). Local government officials of cities with rapid urban development are often unprepared or cannot cope with the diverse demands for basic services and provision of infrastructure to meet social and economic needs

(Ooi & Phua, 2007). This has resulted in the urban poor in global South cities claiming their right to the city by often finding themselves living on marginalised parts of the city in informal settlements, in ecologically fragile zones (Williams et al., 2019).

Informal settlements are characterised by clustered located residential houses where inhabitants lack basic services, security of tenure and non-compliance with building regulations (Baker, 2012). It is assumed that the scale and human condition of informal settlements within a city have a significant impact on its vulnerability (UN-Habitat, 2011; Baker, 2012). Inhabitants of informal settlements are vulnerable to multiple hazards because of their living conditions that are characterised by inadequate basic services such as urban drainage systems (storm and surface drain), inadequate or no provision for sanitation and closeness to dangerous zones such as low-lying flood areas, rivers and other unsafe areas (Armitage, 2011; Baker, 2012; Dodman et al., 2019). This inadequate provision of infrastructure and services is at the core of a lack of resilience, especially to climate-induced disasters such as floods (Revi et al., 2014). These settlements also face challenges of blocked drainages as a result of indiscriminate disposal of wastes in drainages preventing water from leaving an area following heavy rains (Armitage & Rooseboom, 2000). Informal settlements exacerbate the damages caused by flooding by restricting where flood or storm waters can go (Adedeji et al., 2012). Furthermore, climate change impacts occur in informal settlements in addition to numerous underlying factors that contribute to flooding and increase overall risk (Douglas et al., 2008; Ziervogel et al., 2014). Therefore, for many residents of informal settlements, both the location of the dwelling and the quality of the shelter it provides are vastly inadequate in protecting current climate variability and future climate change (Dodman et al., 2019).

2.1.1 State of Urban Flooding and Vulnerability

The unprecedented growth of urban settlements alongside low infrastructure capacity and increased climate uncertainty compound urban climate vulnerability to flooding, especially in cities of the global South (Faling, 2012). Flood risk in cities has been further aggravated by factors that include unregulated substandard informal settlements on hazardous spaces and lack of proper maintenance of drainage channels (Salami et al., 2017). More than 70% of urban spaces in cities comprise unplanned settlements, which are prone to annual floods due to poor

infrastructure, inadequate drainage and lack of solid waste management (Msilanga, 2018). Urban residents in most cities in the global South are particularly vulnerable when disasters such as flooding strike because of their limited adaptive capacity and inadequate resources to mitigate the effect (Pelling, 2003). Dwellers of informal settlements, mostly the urban poor, have low economic capabilities that seriously impact their ability to prepare adequately for an impending natural hazard (Salami et al., 2017). Climate change-induced disasters such as floods pose a threat to informal settlements residents through their exposure to hazards and pre-existing vulnerability and undermine development efforts, which seek to improve their quality of life (Jozipovic, 2015). According to the World Bank (2006), most low-income households are faced with the loss of their natural, physical and social assets without hope of recovery or support from the local institutions. The devastation caused by floods in global south cities is a reflection of the lack of disaster preparedness and capacity to cope (Adedeji et al., 2012). Adedeji et al., (2012) go further to state that most of the risk to urban populations is associated with the incapacity of local governments to ensure provision for infrastructure and disaster risk reduction disaster preparedness and general lack of proper urban planning in the urban areas.

2.2 Community Governance in Informal Settlements

When managing urban floods, conventional flood risk management which prioritises infrastructural and technical solutions is important but is not sufficient to reduce the risk to acceptable levels, particularly in informal settlements. Therefore, it is imperative to understand how flood risk is governed at the community level to be able to move towards a more collaborative response to managing flood risks (Ziervoge et al., 2014). The concept of community governance usually refers to community participation, engagement, and decision-making in public matters and is related to terms such as local governance, social governance, network governance and participatory governance (Totikidis et al., 2005).

> *Community governance may be defined as community-level management and decision-making that is undertaken by, with, or on behalf of a community, by a group of community stakeholders. The focus on 'community' rather than on a corporation, organisation, local government or the public sector is the distinguishing feature of community governance* vis-a-vis *these other forms of governance (Totikidis et al., 2005: 1).*

Totikidis et al., (2005) further state that communities are part of good governance because they address certain problems that cannot be handled either by individuals acting alone or by governments. Decision-making in the planning processes might not be comprehensive or robust without the involvement of the community, especially the vulnerable (Sunarharum, 2016). The ability to adapt and cope with climate change impacts and disasters is determined by how vulnerable people are treated within societal structures and their ability to act collectively (Adger et al., 2003). Hence, there is a need for community governance to promote the participation of community members regardless of their social or economic status in society. This ability is supported by the perceptions and decision-making structures found in society (Wolf, 2011). Since actions taken at the individual level are usually ultimately confined by the social hierarchies and institutions of society, the nature of local institutions and governance mechanisms is fundamental to the community's capacity to adapt to disasters (Agrawal, 2010). The concept of community governance in global south cities is important, especially in disaster management such as flood risk reduction.

However, Dickson et al. (2012) state that community governance in flood risk reduction programmes is complicated by barriers such as inadequate human and financial resources, inadequate drainage infrastructure and communication, including characteristics inherent to top-down governance as well as lack of technical literacy of affected populations relative to flood risk. The extent and quality of services provided to cope and adapt to climate change and disasters are determined by the nature of local governance and institutions (Mearns and Norton 2010). It is therefore imperative to understand how local institutions, especially at the community level are governed and how they function to address climate change impacts as this is key in examining local coping and adaptation capacity.

2.3 Community Experiential Knowledge in Disaster Risk Reduction

It is common knowledge that the people at the community level have more to lose because they are the ones directly hit by disasters, whether it is a major or a minor one as they are the first ones to become vulnerable to the effects of such hazardous events (Gupta, 2003). Therefore, proponents of local community knowledge, such as disaster risk reduction scholars, have often contested that this can contribute significantly towards saving human lives and property from the

negative consequences of disasters such as floods (Hiwasaki et al., 2014). Jones (2012) argues that local knowledge from the grassroots level should not be ignored by authorities as it can help communities to prevent, mitigate, prepare for and recover from the impact of disasters. Surjan et al. (2011), adding that local communities have certain capacities that have evolved over centuries and this capacity and knowledge have been tested over time and proven to be sustainable and effective in both reducing disasters and managing hazards.

However, despite the important role that local community knowledge plays in reducing the risk of disasters and adapting to climate change, this knowledge has not featured prominently in disaster policy and science (Adger et al., 2003). Some disaster risk reduction practitioners are still doubtful of its relevance and effectiveness, and regard this knowledge as being closed, narrow, unintellectual primitive and untested (Herbert, 2000). Scepticism by disaster risk reduction practitioners regarding the use of local experiential knowledge arises as a result of the fact that such knowledge lacks documentation and critical exposure (Dube & Munsaka, 2018). This study, therefore, assesses the importance of local experiential knowledge in flood risk management in Misisi and whether or not their knowledge can be used to design appropriate interventions, including flood disaster preparedness.

2.4 Participatory Mapping

Community-based and participatory mapping is an important issue in risk and disaster management. It has been described by International Fund for Agricultural Development (2009) as a process of map-making in which local people are asked to visualise their association with the land and environment by using language that is locally understood and accepted. International Development Research Centre (1996) identified community-based and participatory mapping as a good practice for locally-based sustainability planning. Goodchild (2007) argues that participatory mapping originated as an alternative to the traditional mapping practices which adopted a top-down, authoritarian, centrist paradigm where experts produced maps used by individuals and communities. Traditionally, maps have been created in a top-down manner by experts who possess the technical know-how usually with little or no regard to community knowledge. However, the new form of mapping (community-based and participatory mapping) practice, on the other hand, is developed by information provided by and for

individuals and communities from anyone that wishes to contribute (Goodchild, 2007). This form of mapping has been advocated for by many authors as a means to fostering inclusiveness and democratic empowerment, because of the possibility for it to transform power to the community by empowering them to participate in decision making (Lydon, 2002). Using community-based and participatory mapping, community members not only have greater access to information but are also better able to express their needs, priorities, and goals as well as influence policy and management decisions (Wright et al., 2009). Community participation assists decision-makers as those involved are more likely to support decisions when they have been consulted and are less likely to oppose them (Yearley et al., 2003). Corbett & Keller (2004) suggest that participation of any form helps create a shared understanding of problems and vision for positive change, which can facilitate an empowering process. Community-based and participatory mapping has the possibility of empowering those that are marginalized in society by giving voice to minority groups, as it can express history that is often unheard and can be a means through which marginalized and oppressed people seek recognition and social justice (Corbett & Keller, 2004). Unlike the traditional forms of mapping that are expert-driven, Corbett (2009) states that community-based and participatory mapping is community-driven and can be used to articulate and communicate spatial knowledge to outsiders that lack expert knowledge, record and archive local knowledge, to advocate for change, increase capacity within communities and to address resource-related conflict among other uses. In mapping this new form, Goodchild (2007) argues that it is no longer clear who the producer and consumer are, as they may have become indistinguishable. This is so because the community is at the forefront of spearheading mapping activities while experts provide technical advice.

Msilanga (2018) states that one crucial dimension of the problem of flood resilience is the lack of spatially explicit information of the infrastructures combined with the lack of participation of local communities. Msilanga (2018) further states that in the absence of up-to-date map data of the settlements and infrastructures, data-driven decisions are difficult to be made. The lack of up-to-date maps and current data of settlements and infrastructures hinders better decision-making from the national and local governments (Msilanga, 2018). As a result, Celedón et al. (2012), states that community members become less resilient to flooding each year. Hence solutions to the problem of flood resilience should enable spatially explicit mapping of flooding as well as

making decisions based on that knowledge (Eckle et al., 2016). Therefore, the need for community-based and participatory mapping has the community's lived knowledge that can be used spatially to map floods. However, often the 'community' is assumed to be a singular entity and 'participation' a framework rather than a lived practice, as such maps made by the community level must not be excluded from the criticism (Rundstrom, 1995).

2.5 Interventions to address urban flooding in informal settlements.

Interventions to address urban flooding in the global South have traditionally prioritised infrastructural and technical solutions through hierarchical top-down approaches that have failed to reduce the risk to acceptable levels, particularly in informal settlements (Ziervoge et al., 2014). Understanding state and community-led settlement approaches are cardinal to be able to move towards a more collaborative response to managing flood risk.

2.5.1 State-Led Approaches

Previous research on settlement intervention efforts indicates that they have commonly been undertaken through hierarchical top-down approaches, with little or no attention being given to how local communities experience the effects of climate change and carry out an adaptation to changing environments (Reid et al., 2009). Interventions in flood risk management approaches have traditionally been driven by experts who possess the technical know-how of reducing the impacts on people's livelihood assets and survival systems, and the city's infrastructure (Mercer et al., 2008). These approaches have been typically deployed by government organisations specifically established with technical capacities and expertise, and with a centralised and hierarchical model of management (Scolobig et al., 2015). The nature of settlement intervention in most cities in the global South is usually top-down with little or no regard for community organisations. Research done by Bakker et al., (2008) in Jakarta showed that engineered solutions implemented by professionals in informal settlement contexts often fail because technical solutions are implemented without input from local communities and without adequate supporting education activities to complement the technical solutions. Another research study by Botha and van Niekerk (2013) on high-risk communities shows that residents felt 'that the government follows a top-down process with local government officials telling community members what to do, but not asking community members what they think should be done' (Botha & van Niekerk, 2013). Top-down flood response approaches in disaster risk reduction

have failed to address the local needs of vulnerable communities (Surjan et al., 2011). It usually views the people affected by disasters as being vulnerable and passive victims or recipients of aid and not as potential resources for development, capable of sustaining their livelihood (Heijmans, 2004). However, these conventional approaches to floods in informal settlements fail to capture the community's social, political and economic pressures that contribute to flooding and increase overall risk (Douglas et al., 2008). Because of the failure of conventional approaches to incorporate community views, Watson (2003) states that these top-down interventions result in conflicting rationalities where for example, municipal officials and community members, are often located at opposite ends of the continuum of ideas with little or no common ground. The aforementioned authors on intervention approaches illustrate how insufficient attention has been paid by state organisations to community participation and governance which significantly limits the effectiveness of flood adaptation measures.

2.5.2 Community-Based Adaptation (CBA) and Approaches

Community-based approaches to climate change and disaster risk management have become an increasingly important solution in a society faced with complex and uncertain urban change. These approaches can provide the local knowledge needed to identify the root causes of human vulnerability and generate adaptive solutions to confront livelihood risk and enhance climate resilience (Allen, 2006). Community-based approaches which are a form of bottom-up activity can fill the gaps of previous top-down, 'command and control' style of management, to the encouragement of 'people-centred' approaches and local participation and reduce our reliance on short-term technological fixes and expert-driven solutions (Scolobig et al., 2015). An example of such approaches is community-based climate change adaptations initiatives which have the potential to help solve problems of climate change and disaster risk management.

The community-Based Adaptation (CBA) approach has emerged as one of the most rapidly expanding bodies of knowledge and intellectual space in the greater field of adaptation science. It is a conceptual and policy concept that embodies people-led efforts seeking to reduce vulnerabilities to climate change-induced disasters such as floods through small-scale adaptation practice, place-based and often grassroots-driven and most importantly community-based (Schipper, 2014). In today's disaster risk reduction studies, community-based adaptation

approaches are being emphasised (Allen, 2006). Pandey and Okazaki (2005) state that this approach promotes the involvement of communities which is important in pre-disaster mitigation as well as in the post-disaster response and recovery process. Researchers and practitioners describe it as a bottom-up and strengths-based approach that can be used to strengthen community-level adaptive capacity and focus upon vulnerable communities (Reid et al., 2009). Importantly, community-based adaptation is process-oriented and based on communities' priorities, needs, experiential knowledge, and collective capacities which necessarily empower people to plan for and cope with the impacts of climate change (Reid et al., 2009). CBA is based on the principle that local communities have the skills, experience, local knowledge, and networks to undertake locally appropriate activities that increase resilience and reduce vulnerability to a range of factors including climate change (Dodman and Mitlin, 2011). Over the last three decades, it has become apparent that top-down approaches to disaster risk management that ignore local capacities and resources fail to address the specific needs of vulnerable communities (World Meteorological Organisation, 2017). People-centred disaster risk management as an alternative approach emerged in response to the limitations of this top-down approach to disaster risk management (Asian Disaster Preparedness Centre, 2007).

However, it is hard to distinguish between community development and CBA as both foci on community empowerment and vulnerability reduction (Allen, 2006). Reid et al., (2009) suggest that CBA is more integrated with sustainable development that addresses the inefficiency of a top-down approach and the social vulnerability (Reid et al., 2009). Coordination within local communities through community-based adaptations can create a sense of ownership in a community and pave the way for successful adaptation strategies (Surjan et al., 2011). Additionally, the crucial factor for a strong CBA is to understand the needs and priorities of the community and engage vulnerable people in designing, planning, implementation and monitoring (Parkinson, 2003; World Bank, 2012). Furthermore, to have effective CBA initiatives and experiences to cope with natural hazards, CBA needs support from different stakeholders such as the local government, Non-Governmental Organisations (NGOs) and the business sector to avoid unforeseen problems. An example is the case of Keko Machungwa an informal settlement in Dar es Salaam Tanzania, where the flooded community elevated their pit latrines and foundations that consequently increased street flooding (World Bank, 2012). This example

shows that community initiatives need to be balanced between local government, community and other stakeholders to ensure effective strategies. CBA ponders on local decision-making processes in both the design of adaptation strategies and the approach to implementation. Proponents of local decision-making suggest that CBA are more likely to be appropriate to the local social, environmental, economic, and political context compared to top-down, one size fits all strategies (Chambers, 1983). Further, community-based adaptation strategies present a scalable and potentially highly relevant approach to the reduction of climate change-induced disasters such as floods for the urban poor, but the approach remains understudied in African urban contexts. This missing gap in knowledge is what the current study seeks to fill. Dodman and Mitlin (2011) explain that CBA tends to assume that the 'community' is a homogeneous entity that can make the appropriate decisions in a democratic way that meets the needs of all members. However, there has been literature that shows that exclusions exist within communities based on dynamics such as age, gender, and socio-economic position (Mercer et al., 2008). Therefore, it is inadequate to engage communities in participatory work without a detailed understanding of power relations that ensures all actors can contribute to the formulation and implementation of strategies (Mercer et al., 2008).

2.5.3 Case Studies

Case studies in this dissertation have been used to capture a range of perspectives in community based adaptions to floods around the world. This gives opportunity to gain a greater understanding of the subject in hand and provide valuable insights into a phenomena or situations in order to reduce the potential for any bias. Below are some of the case studies reviewed.

There are few isolated cases of community-based adaptation projects in the global South. For instance, communities in Dhaka, Bangladesh, have experienced different degrees of unity after the disastrous floods of 1998 (Rashid, 2000). In Dhaka, it is often community-based organisations that provide the first line of relief when floods strike. It is these local grassroots abilities that have been most neglected in flood mitigation interventions in the past but strengthening them is now emerging as a new focus for some agencies (Sanderson, 2000). In this case, several state and non-governmental organisations (NGOs) have now attempted to draw on

traditional coping strategies in their disaster risk reduction strategies. The findings of this case study show that for community-based adaptation to be more effective there is a need for support from different stakeholders, including state agencies.

Cavite City in the Philippines has experienced several cases of flooding. To respond to these floods communities in the city have adopted many adaptation strategies that have yielded positive outcomes despite inadequate support from key stakeholders such as the government and civil societies. However, these adaptation strategies are inadequate in high magnitude floods and not effectively integrated into local development plans (Huq and Reid, 2007). Community strategies employed include: building houses on stilts; reinforcing the physical structure of houses; moving to safer places during crises; and engaging in alternative income-generating activities. Some government strategies (relief assistance, resettlement) despite not being people centre have helped reduce the vulnerability of some households, but the measures are inadequate and costly (Huq and Reid, 2007). The community in response to floods expressed significant concern and proposed several adaptation strategies, many of which were non-structural, capacity-building measures which include: sharing and promotion of traditional knowledge, skills, and practices that enhance adaptation. However, not much attention has been given by the government to improve these adaptation strategies (Huq and Reid, 2007). This is to the fact that this community in Cavite city has less support for the state-led interventions to floods as they are mostly non-consultative and do not involve community members in making decisions (Huq and Reid, 2007).

Muzarabani, is one of the most flood-prone areas in Zimbabwe. This case study looked at two communities of Chadereka and Dambakurima ward in Muzarabani District, Zimbabwe. These two are the most flood-prone communities in Muzarabani district (Mavhura et al., 2013). During the 2008 floods, the worst floods since 2000, the two communities were the most hit. Despite having a District Civil Protection Coordinating Committee (DCPCC), it is inactive and has limited capacity to prepare for, respond to or mitigate the effects of flooding (Mavhura et al., 2013). This leaves the communities with the sole responsibility to decide as individuals or households on what action to take in the face of rising floodwaters. The communities developed their adaptation strategies to guard against flooding. The adoption of a particular set of strategies

depended on people's socio-economic circumstances and the characteristics of the flood (Mavhura et al., 2013). These strategies include the placing of barriers around their houses and erecting shelter on raised land. The community members have also employed other mitigating strategies which include reducing the number of meals, relying on inexpensive food, collecting wild fruits and honey, taking shelter on higher ground with one's personal belongings; searching for alternative sources of income and selling assets. However, these indigenous adaptation strategies tend to be effective in low magnitude floods (Mavhura et al., 2013).

Lessons learnt from the case studies reviewed showed that despite communities providing the first line of relief through their adaptation strategies, not much attention has been given by the government to improve these adaptation strategies. This has resulted in community strategies being less effective in high magnitude floods and a clash of rationalities between the state and the community efforts.

2.6 Concept of Urban Resilience

Resilience is a concept that has been frequently used by numerous academic scholars in various fields. In the context of urban flood management, resilience can be defined as the capacity of a system, community or society, potentially exposed to flood hazards, to adapt by resisting or changing, to reach and maintain an acceptable level of functioning and structure (Djordjević et al., 2011). This is determined by the degree to which the system and society is capable of organising itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures (Djordjević et al., 2011). Carter et al., (2015) describe resilience as the ability of a system or community exposed to a hazard to resist, absorb, accommodate, and recover from the effects of a hazard in time. Urban resilience to floods is defined as 'the capacity of the city to tolerate flooding and to reorganise should physical damage and socioeconomic disruption occur, to prevent deaths and injuries and maintain current socioeconomic identity' (Liao, 2012: 4). While Frantzeskaki (2016:6) defines "urban resilience as the capacity of urban systems, communities, individuals, organisations, and businesses to recover maintain their function and thrive in the aftermath of a shock or stress, regardless of its impact, frequency or magnitude". These definitions show urban resilience as being highly

dynamic and highlight the importance of learning, capacity building and adaptability with regards to creating resiliency that can enhance a city's human and physical capacity.

The concept of urban resilience has been applied to community resilience, stressing the capacity to absorb recurrent hazard impacts and re-organise while changing so as to maintain fundamental structures, processes, identity, and feedback. Although resilience is a recent addition to planners' discursive repertoire, this concept of urban resilience is by no means new, as it has been debated across various scientific disciplines including urban planning and urban regeneration (Jabareen, 2013). Urban resilience to floods has been conceptualized as the capacity to remain in a desirable regime while experiencing flooding (Adger, 2000). Jha et al., (2013) state that to build resilience against disasters such as floods it is important to be prepared for future events, both with a short and a long-term perspective. Urban resilience is an empowering concept for community engagement to create synergies across different programmes for climate adaptation, community empowerment, urban regeneration and programmes that allow a deeper understanding of assets and barriers to overcome social vulnerabilities and social problems (Frantzeskaki, 2016). Resilience requires the inclusion of poor communities living in informal settlements who are more likely to be vulnerable than others because of their low income and lack of infrastructure and services (Jabareen, 2013).

However, this is not the case with state-led interventions in slums. According to Frantzeskaki (2016), for cities to have a (positive) transition to urban resilience, cities should work towards resilience that includes mainly four urban domains: Urban landscape, urban ecosystems; infrastructure and people to recover, thrive and innovate. This is usually not the case with most cities in the global south, as local governments cannot provide services and effective governance that promote the involvement of communities in the decision-making process and implementation of programmes (Ooi and Phua, 2007). Frantzeskaki (2016) further states that the concept of urban resilience provides a new frame to connect different urban aspirations and ideas about liveability, sustainability, cohesion, development and robustness that will co-shape the city's future. According to Silva et al. (2012), an urban system may be considered resilient if it generally exhibits the resilience characteristics defined in Table 1.

Table 1: The Characteristics of a Resilient Urban System

Characteristic	Function
Flexibility and diversity	Ability to perform tasks under various conditions and modify structures to explore new ways of achieving essential goals and functional diversity
Redundancy	Capacity to accommodate extreme events and unexpected demand; Variety of service delivery options
Safe failure	Ability to absorb shocks and cumulative effects in ways that avoid catastrophic failure
Resourcefulness	Capacity to identify issues, determine priorities and mobilise resources
Responsiveness	Capacity to organise and re-organise; Establish function and sense of order in advance of and following a failure
Learning	The ability to learn and internalise past experiences and failures, and use the knowledge to alter strategies.
Dependency on local ecosystems	This involves recognising the value of the services provided by local and surrounding ecosystems (often described as the city's green and blue infrastructure) and taking steps to increase their health and stability.

Source: (Silva et al., 2012: 11)

Urban Resilience has become an important goal for cities, particularly in the face of climate change and the adverse impacts of unprecedented urbanisation (Godschalk, 2003; Batty, 2008; Jabareen, 2013). Therefore, the enhancement of flood resilience by integrating technical, social, economic, and environmental and governance measures contributes to great value in establishing flood-resistant urban systems that assure effective means for adaptive management of disasters (Schelfaut et al, 2011). Countless opportunities are available to make urban areas more resilient through a myriad of structural and non-structural alternatives to urban problems such as floods. However, there is still limited understanding and realisation within the urban planning field and amongst decision-makers, on the possible synergistic means of addressing flood risk at a local scale (Birkmann et al., 2010). Most of the informal settlements in Lusaka are prone to flooding but people have continued to live in these areas. This study, therefore, endeavours to establish how the community members of Misisi absorb the recurrent hazard impacts of flooding as they have resisted moving from this settlement.

2.7 Participatory Slum Upgrading Approach

Neoliberal development policies, such as decentralisation, during the past quarter-century, have significantly reshaped urban development and planning initiatives in developing countries (Jessop, 2002; Das and Takahashi, 2009). Concepts such as good governance, community participation, and participatory slum upgrading have gained in currency and increased the involvement of citizens (especially the urban poor), civil society, and the private sector in local urban planning endeavours (Das and Takahashi, 2009). The Participatory Slum Upgrading Project (PSUP) concept stresses the importance of integrating slum dwellers into settlement interventions by adopting a positive attitude towards slum dwellers through in-situ slum upgrading, using city-wide participatory planning methods and approaches (Hermanson, 2016). Hermanson (2016) further states that in-situ comprehensive urban slum upgrading, which meaningfully includes, responds to and engages residents in the process, can make cities more inclusive and stimulate greater shared prosperity by enhancing social inclusion through participatory processes. The practice of participatory settlement upgrading claims to further democratic principles and responds to the ridicules of democratic will and practice in delivering urban services in urban localities where delivery of basic services is rather dismal and exclusionary (Albrechts, 2012). As such, membership associations and urban development movements seem to present a vision of new forms of democracy and act as devolved networks and mechanisms through which the urban poor show that they can effectively participate in the affairs of cities to re-profile urban development courses (Appadurai, 2001).

In the global South, slum upgrading, have been transformed by policy shifts toward more decentralisation, reduced state control, and greater civil society and community participation in local governance (Das and Takahashi, 2009). It has evolved into a collaborative urban service provision and development approach that seeks participation by local government, non-governmental organisations (NGOs), and citizens (Abbott, 2002; UN-Habitat, 2004). Like many urban development initiatives, slum upgrading is becoming an increasingly participatory endeavour involving NGOs and private firms to improve the financing, delivery, and management of basic services (desired efficiency gains) and to empower communities through their direct participation (Das and Takahashi, 2009: 216). In building these relationships, settlement interventions should be all-inclusive and participatory. Further, upgrading has

significance for climate change adaptation since good quality 'risk-reducing' urban infrastructure and services and better housing quality are at the centre of reducing risks from extreme weather (Dodman et al., 2019). Therefore, this concept is used to establish the kind of participatory development that exists between the community and the state actors in Misisi settlement.

2.8 Policy and Legal Framework Review

In this section, relevant policies and legislative frameworks are reviewed to determine the extent to which pieces of legislation guide disaster management and mitigation.

2.8.1 The Decentralization Policy (2002)

The National Decentralisation Policy is aimed at decentralising central government responsibilities and functions to lower-level government (Councils) through "devolution". In Zambia, community governance systems are supported under the National Decentralisation policy that ensures the enhancement of citizen participation in national development (GRZ, 2013a). One such measure is the policy's emphasis on the establishment of sub-district structures called the Ward Development Committees (WDCs), which are legal platforms for people to participate in development at the ward level. The purpose of the WDCs is to ensure that the residents in the ward have input in decisions made by the council and also act as a link between the community and the council (GRZ, 2013b). For effective administration, the WDCs, sub-committees have been established. These include Planning and Budgeting Sub-Committee; Infrastructure Development Sub-Committee and Socio-Economic Sub-Committee (GRZ, 2013b). Although the decentralisation policy states that Government will realign functions and linkages of central, provincial, district and sub-district governance structures with matching resources, the reality of this has not been seen thus far. There have also been delays in the implementation of the policy from the 90's to date (Kaunda, 2018). This has greatly affected the implementation of community projects.

2.8.2 National Disaster Management Policy (2005)

The National Disaster Management Policy (NDMP) was first launched in 2005, and later on reviewed in 2015 in order to take into account the new issues as presented in the Disaster Management Act, 2010 (DMMU, 2015). This policy rationale is to provide policy direction and define the parameters in which the Disaster Management System (DMS) operates in the country

and to align the roles and responsibilities of agencies to prevent duplications of efforts (Mweemba, 2016). The goal of the policy is "to strengthen national capacities for effective disaster preparedness, response, mitigation, restoration, and prevention, to protect lives and livelihoods, property, environment and the economy at large" (GRZ, 2005:10). However, such is not the case as the DMMU has simply failed to be proactive in its approach to different disasters (Wakumelo, 2012).

2.8.3 National Disaster Management Act, No. 13 of 2010

The National Disaster Management Act was enacted on 13th April 2010. This Act was enacted with a view of incorporating contemporary thinking about disaster risk reduction, decentralisation, and climatic change concerns, which were not pivotal at the time of the formulation of the National Disaster Management Policy (Mweemba, 2016: 37). Disaster Management and Mitigation Unit (DMMU) under the Vice President's Office was established under this act to perform the role of secretariat to the National Disaster Management and Mitigation Structure at the national level. The DMMU is also tasked to implement all disaster management programmes in the country (GRZ, 2010). The act covers all disasters and flood disaster management is one such disaster. Despite the DMMU operation manual emphasis on preparedness, prevention, and mitigation, DMMU has continued to be mostly reactive to its response to flood disasters (Mweemba, 2016).

2.8.4 Public Health Act, Cap 295 of the Laws of Zambia (1995)

The Public Health Act (PHA) is another piece of legislation that has an impact on disaster risk reduction. Under section 10 (1) of part II, the legislation places the responsibility of providing drainages and sewer infrastructure to the local authorities to areas within their jurisdiction. In Misisi like all other settlements within the local authority jurisdiction, the council is responsible for providing adequate drainage infrastructure. When disaster strikes the local authority is mandated to provide guidelines on how to manage epidemics, a factor that is imperative in flood risk management for building flood resilience (Mweemba, 2016). The PHA further places the responsibility on the local authorities to transport persons affected by the communicable disease to treatment centres to prevent such persons from using public transport to avoid spreading infectious diseases (Mweemba, 2016: 35).

2.8.5 Other Pieces of Legislations

Other pieces of legislation that guide disaster management and mitigation include, Vision 2030 which relates to the long-term aspirations and ambitions of the country to become a prosperous Middle-Income Nation by 2030 (GRZ, 2006). To achieve this long-term vision its implementation is attained through the 7th National Development Plans (NDP). Another piece of legislation that is important is the National Adoption Programme of Action which was launched by the government in 2007 to 'broadly communicate to the international community priority activities in addressing Zambia's most pressing needs for adaption to adverse impacts of climate change' (GRZ, 2007: 17). Despite having all these pieces of legislation that guide disaster management and mitigation, not much has been done to avert disasters such as floods in Zambia (Wakumelo, 2012).

2.9 Conclusion

This chapter has reviewed existing literature fundamental to this research to identify gaps and has used the objectives as a framework for conducting the review thereby putting the research problem in context. The chapter has argued the concept of community-based adaptation which is increasingly being used in the global South as an alternative approach to urban planning for equitable and sustainable urban informal settlement intervention. It has further argued the concept of rationalities through state and community-led approaches to floods.

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA

3.0 Introduction

This chapter presents a description of the study area. It consists of six sections. The first section provides the location of the study area. The second section provides for the justification of the choice of the study area. The third and fourth section provides the physical and population characteristics of Misisi settlement respectively. The fifth section provides the socio-economic characteristics of Misisi. The chapter ends with section six which presents the socio-economic characteristics of Misisi settlement.

3.1 Location of Study Area

The study was conducted in Misisi settlement which is an informal settlement in the city of Lusaka. The settlement is located within longitudes 28^{o} 13' and 28^{o} 25' East of the Greenwich Meridian, and latitudes 15^{o} 20' and 15^{o} 28' South of the Equator. The relative location of Misisi settlement has been provided in Figure 1. The settlement is located about 1.5 kilometres south of the Lusaka Central Business District (CBD) along the Kafue Road. The settlement is located in Nkoloma Ward in Chawama constituency and is surrounded by Chawama, John Laing, Kabwata and Kamwala.

3.2 History of Misisi

Misisi is one of the oldest settlements in Lusaka and was established in the early 1960s as a slum. Misisi Compound has been recognised as an improvement area by the Lusaka City planning authority (LCC, 2012). The name Misisi was derived from the wife of the white farmer who was called 'Kwa Mrs' by the employees, hence the name Misisi (PPHPZ, 2015 and Nkole, 2018). The settlement started as a squatter settlement for farm and quarry mine workers after independence. The first inhabitants lived in shacks made from mud, poles and grass roofs. The quality of the houses and the surrounding environment was poor as most people settled in environmentally sensitive areas. Nkole (2018), records that sand mining and stone quarrying, historically done in Misisi, has left huge pits which fill up with water permanently during the rainy season. These pits have become a breeding ground for mosquitoes and other water-borne diseases. The township is also situated on a high water table which makes it prone to seasonal flooding. Misisi residents have been victims of flooding in many past rainy seasons.

Figure 1: Location of Misisi Settlement
Source: Adopted from Google Earth (2019)

3.3 Justification for the Choice of the Study Area

Misisi was purposively selected as a study site owing to its vulnerability to recurrent annual flooding in Lusaka. The other compelling reasons were that unlike other surrounding settlements conflicts of interest between flood control measures and urban developments in the settlement are present and that the residents are proactive in taking measures to contain the situation. Further on, its population shows a wide range of diversity in terms of socio-economic and demographic characteristics making it desirable to study the adaptation strategies used by the residents to mitigate floods. There is a long-standing tradition of community-led efforts to adapt to floods in the area. Some people have lived in the area for decades and have experienced flooding every year of their life in Misisi. Thus, Misisi is a unique case worthy of a study on flooding risk adaptation.

3.4 Physical Characteristics of the Study Area

This section provides for physical characteristics of the study area which make it a unique case study.

3.4.1 Topography

Misisi settlement lies on a relatively flat area, which lies at a low altitude above sea level of about 1257 metres, with some rock out-crops showing in some parts (GRZ, 2013c). Its topography is characterised by steep sloping ridges and shallow valleys that form the Ngwenya - Quarry which poses a dangerous and health hazard (GRZ, 2013c). This is because during the rainy season it collects a lot of water as a result, contributing to flooding in the settlement whenever the water overflows (GRZ, 2013c).

3.4.2 Drainage system for Misisi

The major natural drainage systems for Misisi are the Ngwenya - Quarry and Bluewater - Quarry which was created as a result of stone crushing. Hence Misisi being located south of Lusaka city is drained by three streams which include Chunga, Ngwerere and Chilongolo streams respectively which seem to provide water in Ngwenya and Bluewater through underground aquifers and surface runoff (Baumle and Kang'omba, 2009). Water circulates in the environment through precipitation, overland flow, infiltration, storage, and evapotranspiration. The upper surface of the saturated area, the water table, generally mirrors the surface terrain.

3.4.3 Geology and Soils

The geology of Lusaka comprises an ancient basement complex overlain by limestone and dolomite. Its porous and soluble characteristic renders it susceptible to pollution. The carbonate rock/dolomite and schist are mainly distributed in Misisi settlement. Soils of Misisi vary according to the underlying geology. Those developed over the limestone and dolomite varies in texture and depth from red-brown class to dark loamy soils. They are usually very shallow, brown, medium-textured soil with numerous outcrops of limestone & dolomite and isolated pockets of arable soils; the flat topography causes drainage difficulties (Millennium Challenge Corporation, 2011).

3.4.4 Climate

The settlement experiences a savannah type of climate like most places in Lusaka which are typical of the Central African Plateau whose annual pattern of weather is largely determined by the movement of the Inter-Tropical Convergence Zone (ITCZ). Climate has three distinct seasons. These include a cool dry season, hot season and a warm wet season. The minimum daily temperature in June and July falls below 10° C, whereas the temperature in the hot season ranges between 27 and 38° C (Government of Republic of Zambia (GRZ) & United Nations Development Programme, 2010).

3.5 Population

Misisi settlement is a recognised informal settlement by the Ministry of local government and Lusaka city council nevertheless, it has not yet been upgraded by the government. It had an estimated population of about 75,082 people in 2010 (CSO, 2012). This total population in the area comprised 37,596 males and 37,486 females (CSO, 2012).

3.6 Socio-Economic Characteristics

Misisi settlement experiences problems of flooding, poor sanitation, inadequate access to services such as the supply of clean potable water, social services such as healthcare and schools (JICA, 2009). The majority of people in Misisi settlement are in informal employment and a few informal sectors. The informal sector provides sufficient space for the largest number of economically viable people in the settlement. Also, these people raise their income through different economic activities as evident by several small and household businesses along

footpaths, Chifundo Road, Lime Main Road, and Nyerere Road. These economic ventures include, among others, bricklaying, welding, carpentry, saloons, barber shops, groceries, welding, charcoal, and plastic bag selling, scrap metal gathering, house and shop rentals, two public markets near Katwishi and Lewis Grounds. The formal sector accommodates mainly a small number of people who work for public and private institutions. The private sector accounts for the largest number of employees who are working in the industrial area doing different jobs, including selling in shops, and others are domestic workers. While the public sector includes personnel such as teachers, nurses, security guards, drivers, policemen and women, clerks, and others who draw their income from their monthly salaries and wages. Misisi like many other informal settlements in Lusaka is characterised by high levels of poverty and unemployment (Habasonda, 2012).

3.7 Conclusion

This chapter provided the physical and socio-economic description of the study area. The chapter endeavoured to provide a vivid picture of the situation in Misisi that has contributed to its vulnerability to recurrent annual flooding. The description of the study area provided in this chapter helped in guiding the research. The next chapter presents the research methodology used to undertake this study.

CHAPTER FOUR: RESEARCH METHODS

4.0 Introduction

A research methodology is a path of finding answers to the research questions (Yin, 2016). This chapter indicates and discusses the research methodology that was used to execute the study. It consists of ten sections. The first section presents the research design. The second section provides the target population. While the third and fourth sections present the sample size and sampling techniques respectively. The fifth section presents the data collection methods used. While section six shows how the data quality and validity of research instruments used for data collection were addressed. Section seven and eight present data analysis methods and limitations encountered during the study respectively. Section nine shows how research ethics were incorporated into the study. Finally, the last section provides a conclusion on this chapter.

4.1 Research Design

A research design can be defined as the conceptual structure within which research is constituted (Kothari, 2004). It provides the blueprint for the collection, measurement, and analysis of data. The research design is a glue-like structure that holds all the elements in a research project together (Kombo and Tromp, 2006). This study was executed using a case study research design to obtain the required information. Yin (1994:14) defines the case study research method as "an empirical enquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not evident". Watson (2003) cites Flyvbjerg (2001) and argues that planning research needs to return to the tangible, to the empirical and to case research. According to Flyvbjerg (2004:298), the point of the exodus of any good research that seeks to enhance planning thought must "benefit from focusing on case studies, precedents and exemplars, practical planning rationality, and judgement" which evolve and operate primarily by in-depth case narratives. The case study method places more emphasis on the full analysis of a limited number of events or conditions and their interrelations (Kothari, 2004). A case study is more appropriate for answering both qualitative and quantitative research topics by seeking to answer what, why and how restricted questions (Yin, 2003). The case study research design has been adopted because it allows for collecting lived experiences from Misisi community members and state-led organisations that

have been affected directly or indirectly by these floods. To achieve this, the research employed 3 main phases shown in Figure 2. A mixed case study approach was used in the study, which employed both qualitative and quantitative methods.

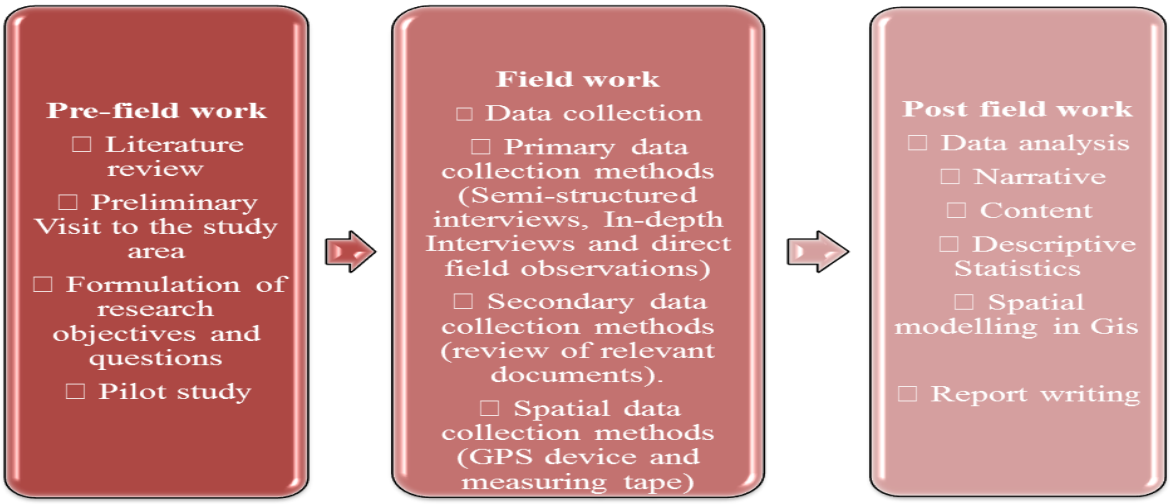


Figure 2: Phases of the research
Source: Adapted from Chongo (2014: 33)

4.2 Target Population

White (2003:56) defines a population as "a universe of units from which the sample is to be selected". While Best & Kahn (2006) defined a population as any group of individuals that has one or more characteristics in common and that are of interest to the researcher. This means that a target population is a specific group of things necessary for a particular project. To obtain the much-needed data for this research the target population of this study included Misisi residents and key informants from particular organisations. The target population included Misisi residents affected by flood and key informants were drawn from the Lusaka City Council (LCC), Ward Development Committee (WDC) and Disaster Management and Mitigation Unit (DMMU).

4.3 Sample size

Leedy (2005) states that a sample is a subset of a population and a researcher can use his or her judgment and experience to determine the sample size. In this study, a sample size of 65 flood-affected respondents was used. This is because the number was estimated to be the optimum number necessary to enable valid inferences to be made about the population. It was

supplemented by three (3) key informants from Lusaka City Council, Ward Development Committee and Disaster Management and Mitigation Unit.

4.4 Sampling Techniques

To select the required sample, the respondents were selected purposively. The purposive or judgemental sampling technique helps target a group that is suitable to bring out rich information related to the central issue being studied for in-depth analysis (Black, 1999; Kombo and Tromp, 2014). According to Tichapondwa (2013), purposive sampling allows for the researcher to hand-pick certain groups or individuals to include in the sample. The selected respondents from Misisi were purposively selected from areas that experience floods with the help of community leaders. The researcher also used purposive sampling to select the three key informants.

4.5 Data collection

Data collection refers to the gathering of specific information which is aimed at proving or refuting some facts (Kombo and Tromp, 2006). Primary data was collected through the administration of semi-structured and in-depth interviews, which according to Biggam (2011), are used to solicit in-depth information because of their flexibility and allow for the addition of more questions to the conversations with the informants. Therefore, using semi-structured and in-depth interviews enabled the researcher to get first-hand information from the affected residents of Misisi and key informants respectively. The researcher also employed the non-participant field observation method by directly observing and taking photographs to capture events and scenes related to the physical effects of flooding and adaptation strategies adopted by the local community. The non-participant observation was used to supplement and compliment the findings obtained from the interviews because certain information could not be obtained through the use of interviews. Spatial data on areas prone to floods was collected with community leaders and residents using a Global Positioning System (GPS) device to mark some households which had water marks on their houses. A measuring tape was used to measure the height of water marks on the buildings. These participants were all volunteers who were trained by the researcher before conducting the study on what information to obtain and how to use the devices. The community together with the researcher identified and collected all relevant information on places and buildings that are affected by floods. The team collect 320 watermark

points which were interpolated to raster using the kriging method in ArcGIS to produce the flood risk map. Using the GIS spatial modelling technique and a 20-metre resolution satellite image the researcher was able to estimate the number of houses and occupants that would be affected by the floods. The researcher ensured that the visual results obtained were physically verified in form of a group discussion by the community research participants of the mapping outputs, thereby, making participatory community flood mapping a reality. Secondary data was obtained through the review of documents which included reports, newspaper articles, among others.

4.6 Data Quality and Validation

Kothari (2004) defines validity as the extent to which differences found with a measuring instrument reflect true differences among those tested. In this research to ensure quality, objectivity, and validity triangulation procedures were followed. The researcher ensured the validity through the use of the triangulation technique using more than one method which involved a comparison between semi-structured interview findings, in-depth interview findings, observation findings, and secondary data findings and filtered accordingly. The use of different types of tools to collect the data was useful in ensuring validity of the findings. Additionally, in this study issues of validity of research instruments used for data collection were addressed through conducting a pilot study.

4.7 Data Analysis

Data analysis refers to a systematic process, which involves the use of statistical or logical techniques to describe, summarise recap, and evaluate data (Shampoo and Resnik, 2003). Kasonde-Ng'andu (2013) defines data analysis as a manipulation of the collected data to draw conclusions that reflect on the interest, ideas, and theories that initiated the study to uncover the underpinning structures and extract fundamental variables thereby testing any underlying assumptions. In this study, empirical evidence gathered from key informants and affected residents of Misisi were analysed using narrative and content analysis and recorded using an audio recording device and then later transcribed for deeper analysis. This helped the researcher to organise analytically various experiences of floods in Misisi. Narrative analysis was used because it offers a platform from which to focus on the lived experiences of people through the stories they tell (Mouton, 2001). While the content analysis was used to analyse data obtained from interviews, which according to Hancock (1998), gives a descriptive account of what was

said or read, with nothing assumed about it. Further, data from semi-structured interviews were analysed using descriptive statistics. Frequencies, tables, and graphs were made using the Scientific Package for Social Sciences (SPSS) software version 20.0 and Microsoft Excel 2010. While spatial data were analysed and modelled using Geographical Information Systems (ArcGIS) software.

4.8 Limitations of the study

The study faced several challenges. Firstly, the study only used one field research assistant to assist with data collection. Financial resource constraints limited me form hiring more research assistants from the community. Secondly, the researcher experienced unexpected participant behaviours such as failure to be ready for interviews on time, answering phone calls and limited time and attention during the interview process. The researcher also observed that some research participants' interview answers contradicted one another on several issues and this made data analysis challenging and time-consuming. However, these limitations were resolved through the use of the triangulation technique which involved the use of more than one method to compare with the answers given by the participants.

4.9 Ethical Considerations

In conducting interviews, ethical issues such as confidentiality were given due consideration in the study. First and foremost, the researcher sought consent from the University of Zambia relevant authorities to undertake the study. Secondly, before conducting this research, informed consent of participants was considered during data collection, individuals participating in the research study were informed of the nature of the study so that they may choose whether to participate or not. Data that would potentially harm the research participant has been omitted or presented anonymously and anything of a devious nature has been avoided by the researcher. The researcher ensured that the research was undertaken with integrity at the highest standards by ensuring that data was precise and presented fairly. Ultimately, to ensure that good ethical values were upheld the researcher had to take full responsibility for the study and any unforeseen consequences it could attract. All the mentioned activities were done to ensure that the rights of the participants were respected, and their dignity as human beings was safeguarded.

CHAPTER FIVE

PRESENTATION OF RESEARCH FINDINGS

5.0 Introduction

This chapter presents the findings of the study. It consists of six sections. The first section looks at the socio-economic profile of the respondents and their households to understand the socio-economic status of flood-affected residents in Misisi. While the second section presents the community governance structure used for flood adaptation in Misisi. The third and fourth sections show flood risk areas in Misisi using community knowledge and adaptation strategies used by the community to urban flooding respectively. The fifth section presents the role of state agencies in flood mitigation in Misisi and what rationalities have risen with the community. The last section provides a conclusion to the chapter.

5.1 Socio-Economic Profile of the Respondents

The study targeted flood-affected household heads or adult household members in Misisi Settlement and of a total of 65 respondents interviewed, 67 percent were female, and 33 percent were male.

The research found that the majority of respondents (66.2%) were married while 13.8 percent were single. Widows/widowers accounted for 10.8 percent and the divorced accounted for 9.2 percent of the respondents. Marital status was analysed in this study as the choice of adaptive strategy may be influenced by the condition of being either single, married, divorced or widow/widower.

Figure 3 illustrates the educational level of the respondents. It can be seen from the figure that the highest percentage (71%) of the respondent's level of education is Primary. Education level influences an individual's understanding and preferences on development choices and even their ability to participate effectively (Malanda, 2019). The results simply show that much work has to be done in the area of education as the majority of the respondents only have primary education.

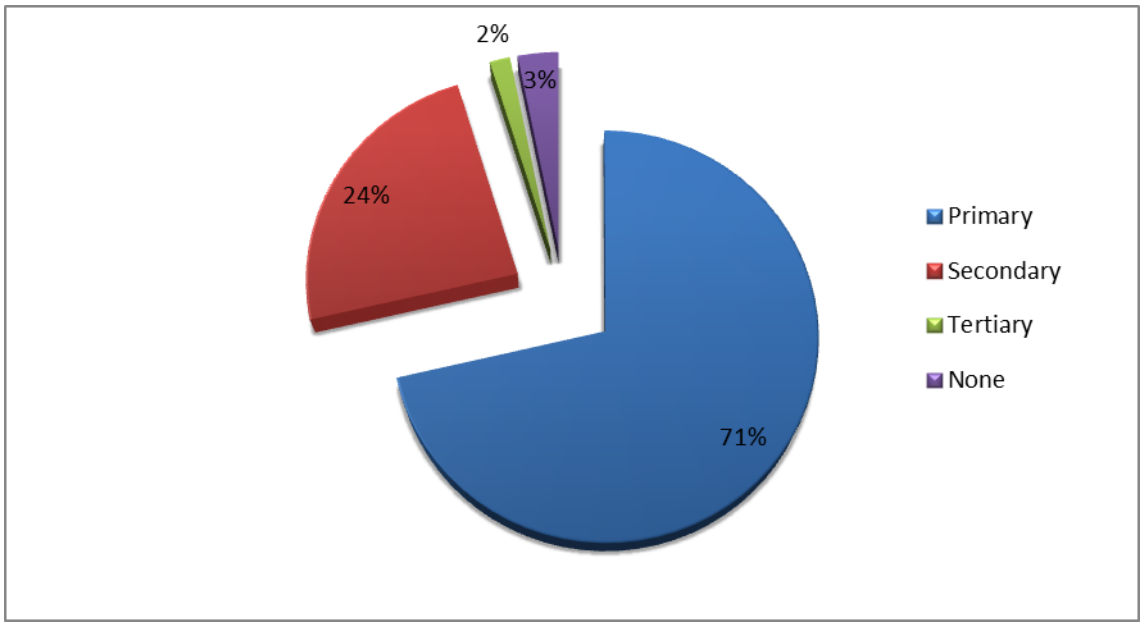


Figure 3: Level of Education of Respondents
Source: Field Data, 2019

The research findings show that housewife has the highest percentage of the occupation, which is 54 percent (Figure 4). This can be understood because the interview took place during the daytime when men as household heads were working. Entrepreneurs in this research included mostly people engaged in grocery business commonly known as *tu-Ntemba*, others were carpenters, marketeers, hairdressers, bricklayers, and tailors. Government employees included police officers, nurses, office assistances and general workers. The occupation of respondents was considered in this research based on the assumption that as part of economic activity it had a close relationship with the type of adaptation mechanism applied by the community to adapt against floods (Dewi, 2007).

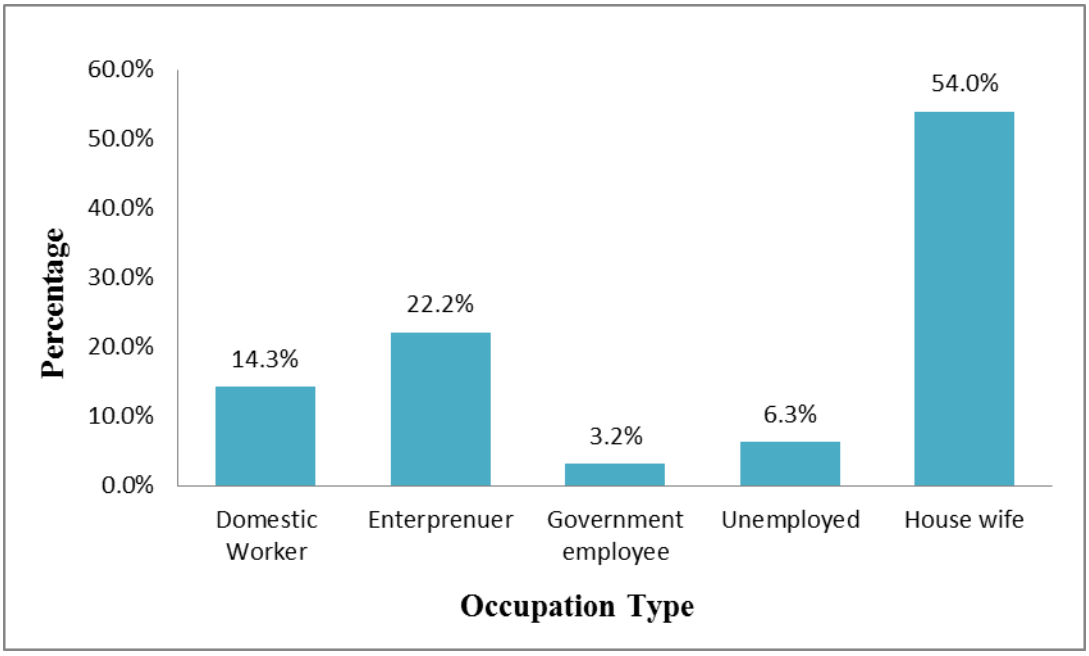


Figure 4: Occupation of Respondents

Source: Field Data, 2019

Figure 5 shows the household incomes per month for the respondents. In terms of household monthly income, the survey finds that the majority of respondents (74.6%) earned less than K1000.

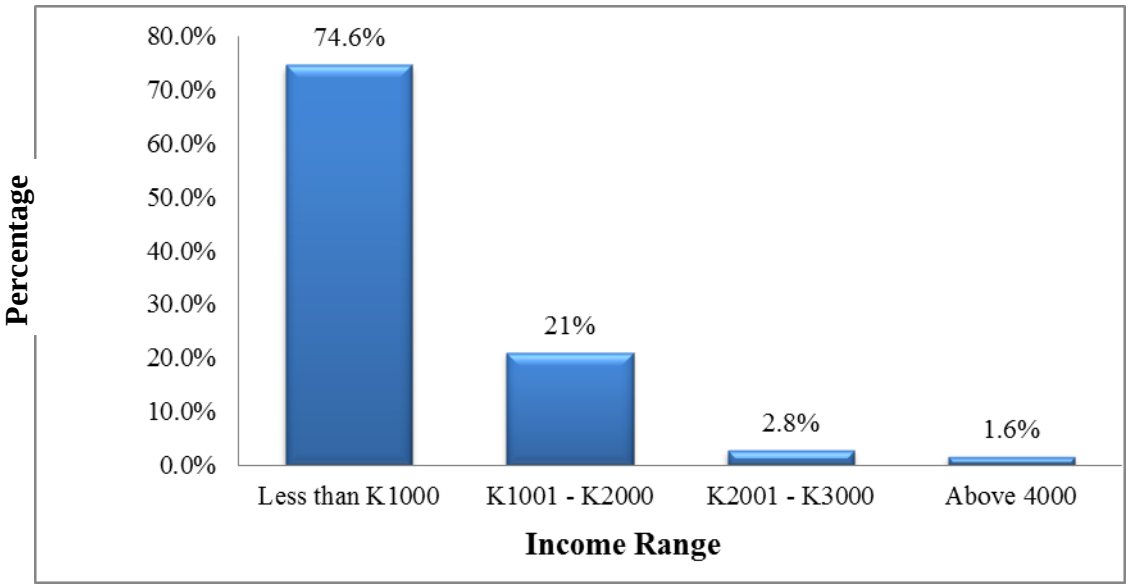


Figure 5: Monthly Income of Respondents

Source: Field Data, 2019

The study established that the majority of the respondents earned an income of less than K1000 per month in Misisi. The low-income levels among the majority can be attributed to the fact that few residents are in formal employment. Therefore, with the limited financial capacity, it was observed that residents in Misisi normally give priority to other immediate and important expenditures such as food, education, and health but little consideration for investing in flood mitigation infrastructure. Financial capacity plays an important role in the choices of an individual's adaptation strategies.

The results from the study in Figure 6 indicate that despite the presence of urban flooding in Misisi, the majority (60 percent) of the respondents interviewed choose to stay in the study area because they were living in family houses.

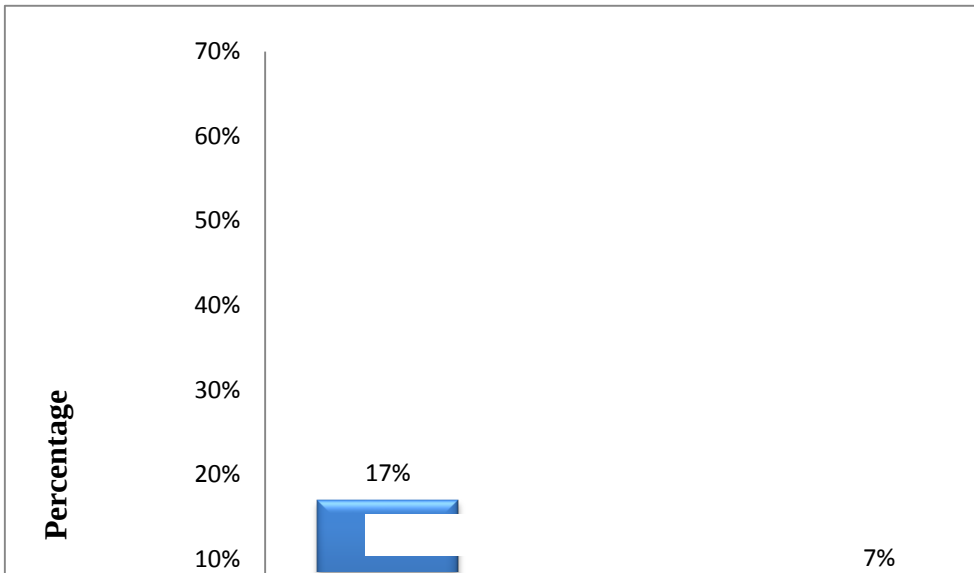


Figure 6: Reasons for Staying
Source: Field Data, 2019

Based on the findings, the main reason the majority of the respondents continue to stay in Misisi despite the floods was that they had inherited plots and houses from their families. It should, however, be noted that most people interviewed had more than one reason to stay.

5.2 Community Governance Structures

Based on the research findings the Councillor, Ward Development Committee (WDC) and Zone Representatives make up the main governance structure which is based on the settlement that is relevant in the reduction of flood risk and works hand in hand with the community to promote flood resilience. The WDC and zone representatives also work with the area councillor who acts as their link to the council (local government) and different organisations which operate in the area (see Figure 7).

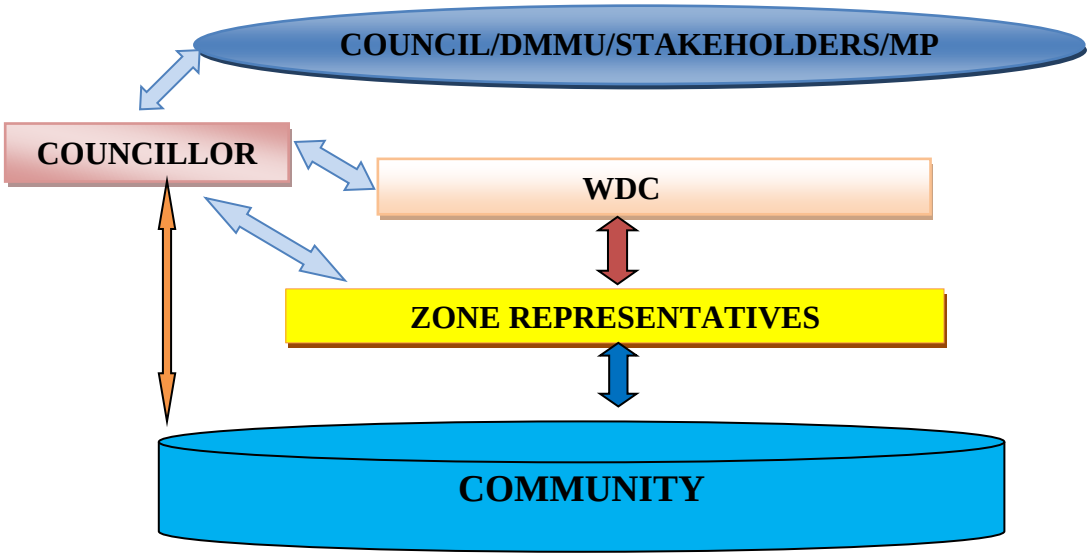


Figure 7: Reporting System
Source: Adapted from GRZ, 2013a

The WDC forms an important structure in Misisi because it facilitates and coordinates all development activities in the settlement. The responsibility to facilitate and coordinate the establishment of the WDCs falls under the Council. It consists of democratically elected members of the community who form the executive committee. Whenever there is a disaster, or likelihood of one, this committee and the area councillor through zone representatives call the community for a meeting where decisions concerning them are made. At this point, it becomes the work of the councillor to solicit help/funds from relevant authorities and other stakeholders. Several research participants indicated that community leaders through the Ward Development Committee form an important structure as they facilitate and coordinate all development activities in the settlement. The research participants indicated that whenever they would want

their grievances to be heard by the councillor and the council they would always go through the WDC as noted by an informant:

> *The WDC is the only community structure I know working in Misisi. Its leaders are members of Misisi, so, they know exactly what and how to mobilise residents when there are floods. They represent and work for and with the community and they know exactly the needs of its peoples. Whenever there is a disaster, the leadership consults and reports back to the community so that everybody is involved in the processes* **(**Community resident, 15th April 2019: Personal communication).

However, some of the community members interviewed stated that it is not always that they are called by the WDC and councillor to participate in the planning and implementation of projects. Especially when it involves capital projects such as the construction of roads and drainages in the settlement. This has resulted in rationalities where some of the community members do not appreciate state-led efforts to mitigate floods in Misisi as they feel not part of the process.

5.2.1 Challenges Faced by Community Governance Structures

In their quest to build flood resilience in Misisi, the Ward Development Committee (WDC) faces several challenges. The main problem is the inadequacy of financial resources to invest in effective flood mitigation strategies and equipment. The WDC solely relies on financial support from the council and other well-wishers such as civil societies, private individuals and non-governmental organisations working in the settlement. As a result, the WDC finds it easy to intervene in a reactionary manner to the flood-related crisis in Misisi, since such approaches are cheaper although they tend to be expensive in the long term. Upon further investigations, it was established that, despite the likelihood of occurrence of floods in Misisi, no funds were allocated to building flood resilience in the settlement by Lusaka City Council and DMMU. As such, the ability of these community structures to participate in flood management is mostly restricted to reactionary disaster management, when funds are availed. The results also reveal that in Misisi, there is little investment in preparedness, prevention, and mitigation which are necessary for flood resilience building. Local-level planning for climate adaptation was also lacking. The lack of disaster preparedness and planning, however, was attributed to the lack of support from

various stakeholders in the form of finance and skilled human resource as noted by a key informant:

> *It is difficult for us to plan for disasters due to lack of support from various stakeholders such as training and financial support, (*WDC official, 22nd July 2019: Personal communication).

The research findings further reveal that other challenges faced in flood mitigation in Misisi include the nature of settlement and lack of drainages. Houses in the settlement are haphazardly built as a result the WDC finds it difficult to set up proper drainage systems. The few drainages that have been built in the settlement were not properly maintained as evidenced from the indiscriminate waste disposal by some residents. When it rains the accumulated wastes in drainages block water from flowing causing an overflow. The indiscriminate disposal of wastes also contributes to flooding in Misisi. When further investigated why some residents throw wastes in drainages it was discovered that the settlement had no adequate waste bins, further some residents did not have the sense of ownership to the drainages as they claimed it is the responsibility of the local authority to clean and maintain drainages in the settlement.

> *The government did not consult us or involve us when buildings these roads and drainages. They only notified the people, whose houses were to be demolished to pave way for the roads and drainages, (Community resident, 12th April 2019: Personal communication).*

However, the council official interviewed stated that before the conduct a project such as constructing drainages they involve the community through the councillor and the WDC. The councillor and the WDC conduct all community consultations which are relayed to the local authority.

5.3 Flood Risk Areas in Misisi

Figure 8 shows the spatial distribution of flood risk areas and the height of floods. The information on flood risk areas was collected during the fieldwork with the help of community leaders and members. The flood height was measured based on lived experiences of affected residents and reference to building watermarks (Figure 9). This information was used to model the spatial distribution of floods as shown in Figure 8.

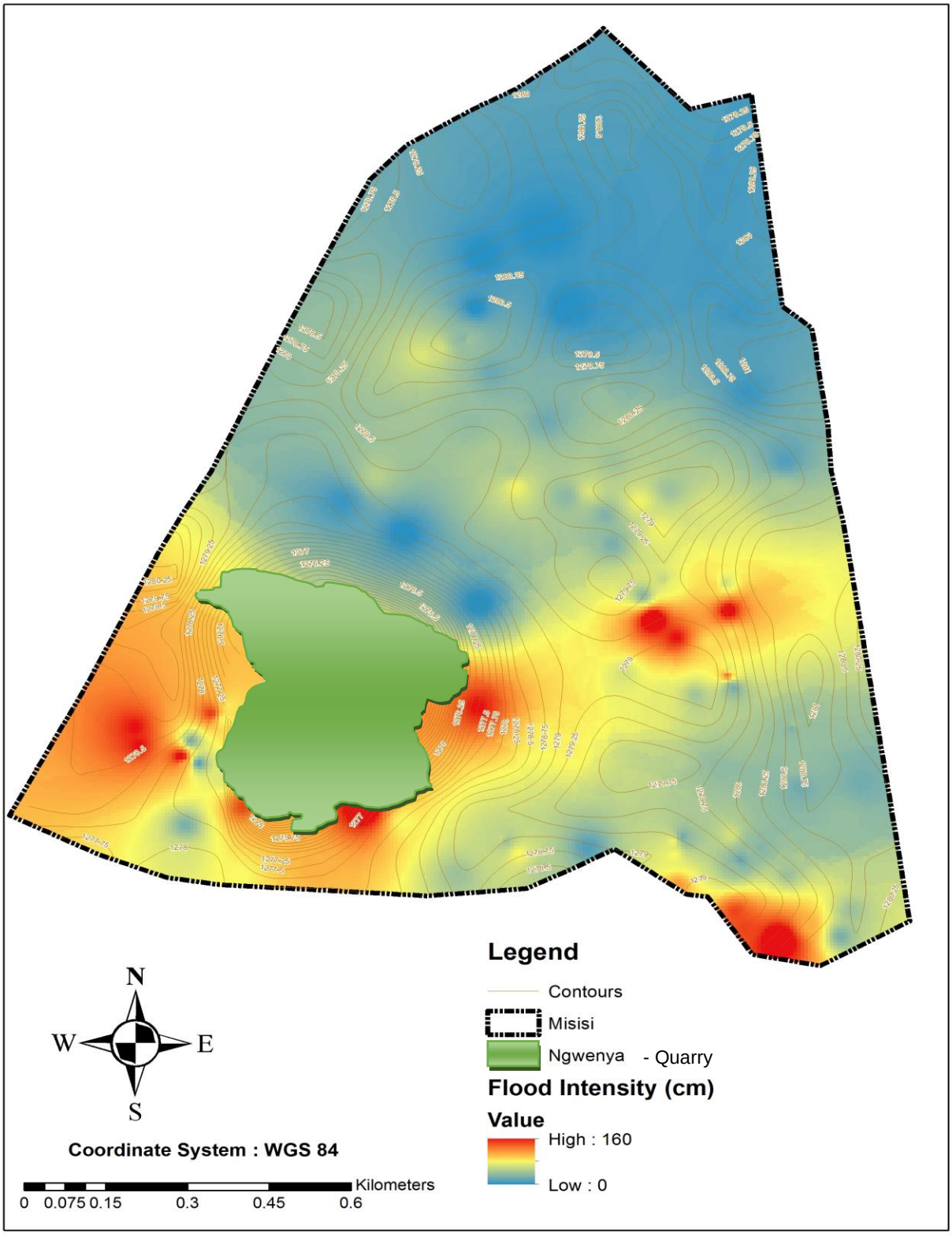


Figure 8: Flood Risk Area Map
Source: Field Data, 2019

Figure 9: Level of Flood Waters
Source: Field Data, 2019

5.3.1 Flood Impacts

Figure 10 shows the spatial distribution of houses in the above-identified flood risk areas in Misisi. From a total of 4965 houses mapped from a 20-metre resolution satellite image, 64% of the houses fall in low flood risk areas, while 36% fall in high-risk areas. It should be noted that the study concentrated on dwellings to be able to estimate how many people would be exposed to such risk.

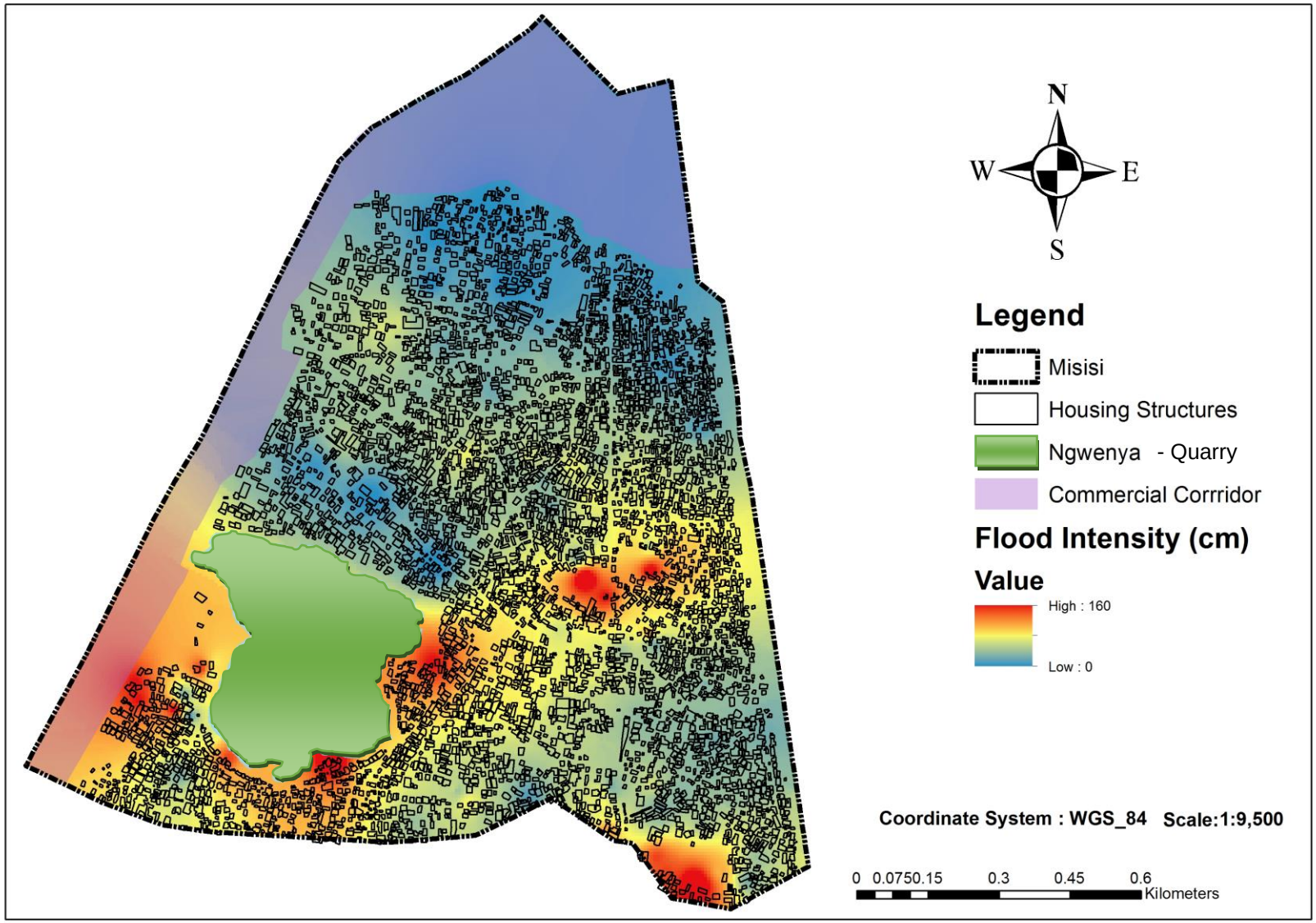


Figure 10: Spatial Distribution of Houses in Flood Risk Areas
Source: Field Data, 2019

5.4 Community Adaptation Strategies to Urban Flooding in Misisi

Residents of Misisi have continued to live in flood-prone areas despite the likelihood of annual floods because they are not willing to lose their land and livelihood. Being located in flood-prone area, the majority of the residents are aware of the danger involved and have developed ways of adapting to floods. The study found that flood-affected residents of Misisi tend to employ structural and non-structural measures to adapt to floods. Below are some of the commonly used adaptation strategies.

5.4.1 Use of Sand Bags

The majority of affected residents in Misisi use sandbags, which are put around their properties i.e. houses, shops to prevent erosion, provide accessibility and block flooding water (see Figure 11). Residents buy the sand and stones put in the sandbags from other parts of Lusaka as they are not allowed by their community leaders to make quarries in the settlement for fear of flooding. However, this strategy according to people's lived experiences was not adequate to resist heavy storm water from heavy rainfalls, because the sandbags in some cases were washed away. Whenever the sandbags blocked water from entering a plot, the caused floods in neighbouring plots as the blocked waters cause floods. One of the respondents, a 56-years old widow stated the following:

> *When it starts to rain, the majority of us use bags filled with sand which is very costly to buy that we place them around our houses to prevent the water from entering. This works when the rainwater is not much, but when it rains heavily and the water from the Ngwenya starts to enter our houses we end up leaving our houses,* **(**Community resident, 12th April 2019: Personal communication).


(a)

(b)

Figure 11: Sand Bags

Source: Field Data, 2019

5.4.2 Raised Doorsteps and Pit Latrines

As a result of flooding, most households in Misisi raised their door steps and pit latrine steps to prevent storm water from filling up their houses and pit latrines. Door steps in most households were raised to about 30cm and the pit latrines were raised to about one meter above the plinth level. However, it was noted that this strategy was also inadequate to cope with severe flooding (see Figure 12).

(a)

(b)


Figure 12: Raised Door Step and Raised Pit Latrine

Source: Field Data, 2019

5.4.3 Raised House Foundations and Construction of Protective Walls

Most of the flood-affected houses in Misisi were observed to have been built on raised foundations and a few houses that had extra space around their yards constructed protective walls to prevent water from entering their houses (see Figure 13). However, from the interviews conducted it was revealed that this solution mostly helped individual houses and it largely blocked water flows during flooding. The construction of protective walls in some instances resulted in floodwater remaining within the plot for a long period causing damages such as erosion of the foundations of buildings and cracked walls. The stagnant water also acts as a breeding place for mosquitoes leading to high cases of malaria and can also contribute to the community vulnerability to cholera and other waterborne diseases such as dysentery and diarrhoea.

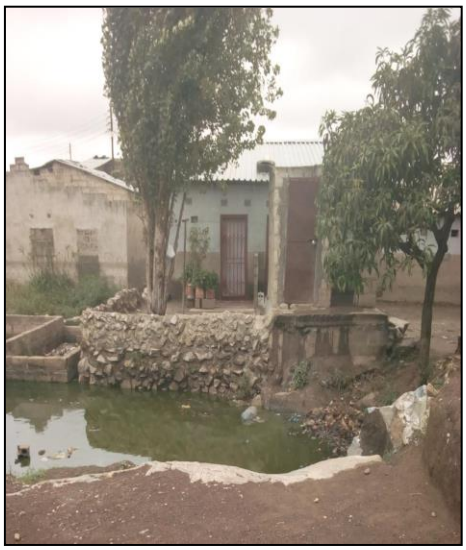
(a)  (b) 

Figure 13: Raised Foundations and Protective Wall
Source: Field Data, 2019

5.4.4 Digging of Small drainages and Making of Sand Banks

Household interviews conducted in the settlement showed that some households in the community individually and sometimes come together to dig small drainages that were used to channel the storm water away from their houses and others bought sand which they used to fill their yards to prevent water from entering their houses. However, these strategies were equally not very adequate especially during heavy rainfall. The drainages were only dug once floods started. The depth of these drainages are usually between 30cm to 100m. Further on the existing

storm water drains in Misisi are improvised, not coordinated and individually provided. Also, due to the lack of proper solid waste management residents dispose of waste into the constructed drainages, contributing further to the increase in flooding when it rains heavily (see Figure 14). These results show that residents of Misisi were more reactive than proactive in adapting to floods.

Figure 14: Haphazard dumping of solid waste in drainages
Source: Field Data, 2019

5.4.5 Placement of Properties on Stones and Forced Temporary Migration

Some households interviewed stated that when it starts to rain they place their properties such as kitchen utensils, beds, sofas, televisions and fridges on stones to prevent floodwater from damaging them. One of the interviewed respondents in Misisi stated that:

> *Life in Misisi during the rainy season is tough especially when it starts to rain heavily. We are forced to place our household properties on higher surfaces of stones, concrete blocks and cardboards to prevent water from destroying them especially when floodwaters start to enter our houses,* **(**Community resident, 15th April 2019: Personal communication).

Community members are forced to temporarily move from the flooded settlement when the strategies used to adapt to floods fail. Some normally seek refuge with their neighbours and relatives until water levels go down. And for others, they are forced to seek temporary alternative accommodation either from well-wishers or the state. However, participants interviewed say that this negatively affects their livelihood, especially for school-going children who are forced to miss school. Furthermore, households interviewed stated that they were also affected financially as they did not prepare for the migration.

The findings of this research further reveal that community-based adaptations in the settlement were not supported by various stakeholders responsible for flood mitigation before the coming of floods hence their ineffectiveness to high magnitude floods. The community adaptation strategies in Misisi have been neglected and not factored into local government development plans and state interventions. The state fails to see the community and its strategies as potential tools to minimise and even mitigate the adverse impacts of floods in the settlement. Although the community provides the first line of relief when flood disasters strike, the state has not seen the potential of harnessing community adaptive experience in mitigating flood disasters.

5.5 Role of State Agencies in Flood Mitigation in Misisi

Several state-led organisations are active in flood risk management in Misisi. A key informant indicated that the Disaster Management and Mitigation Unit (DMMU) and Lusaka City Council (LCC) are state agencies that play a major role in flood mitigation in Misisi. The main actor is DMMU, which coordinates all disaster preparedness, mitigation, and response programmes. It functions as a secretariat for the national disaster management structure. The main function of the unit is to coordinate the actors and to mobilise the needed resources for all activities related to disaster management. To this end, an official narrated that in Misisi the unit works with the community to mobilise resources through the Satellite Disaster Management Committee. The Satellite Disaster Management Committee operates at the grass-root level to identify the affected households and to educate the residents on matters such as hygiene to prevent the spread of waterborne diseases. However, the findings of the research revealed that the Satellite Disaster Management Committee is almost non-existent as they do not have any site office in

the settlement and only appear when there is a disaster. Hence, there is not much representation of DMMU in the settlement before a disaster.

Another key actor in flood mitigation in Misisi is the Lusaka City Council (LCC), which works directly with the affected communities. LCC has to provide storm drainage, manage solid waste, and sensitise the community on how to adapt to floods to minimise the impacts of floods. To this effect, an official stated that:

> *The mandate to manage the drainage infrastructure is given to the council which plays the overall role of planning for drainages, construction of drains and ensuring that it discharges to a comfortable discharge point, as well as maintenance of drainages, in the community and within the city,* **(**LCC Official, 21st June 2019: Personal communication).

However, despite Lusaka City Council's mandate to construct and maintain drainages, it was established that there are few drainages in the settlement most of which are blocked. The LCC official interviewed stated that the council was stretched thin because of inadequate finance and equipment which makes it difficult to provide services.

The official further disclosed that strategies LCC, has taken can be traced back as far as the formulation of the JICA master plan in 2009, which took into account the flood situation in the area. The master plan recommended that the area needed to be re-planned. This means that people are not allowed to occupy areas labelled as green zones especially areas around the Ngwenya and blue water - Quarry (Figure 15). Buffer zones were marked and people had to be relocated to ensure that when a flood situation happens, people in that area could not be affected as these areas are flood-prone and are low lying. However, this plan has not been welcomed by some community members due to fear of losing their homes and being displaced to other areas. As a result, the proposed interventions have not yet been implemented as the state is at loggerheads with the community.

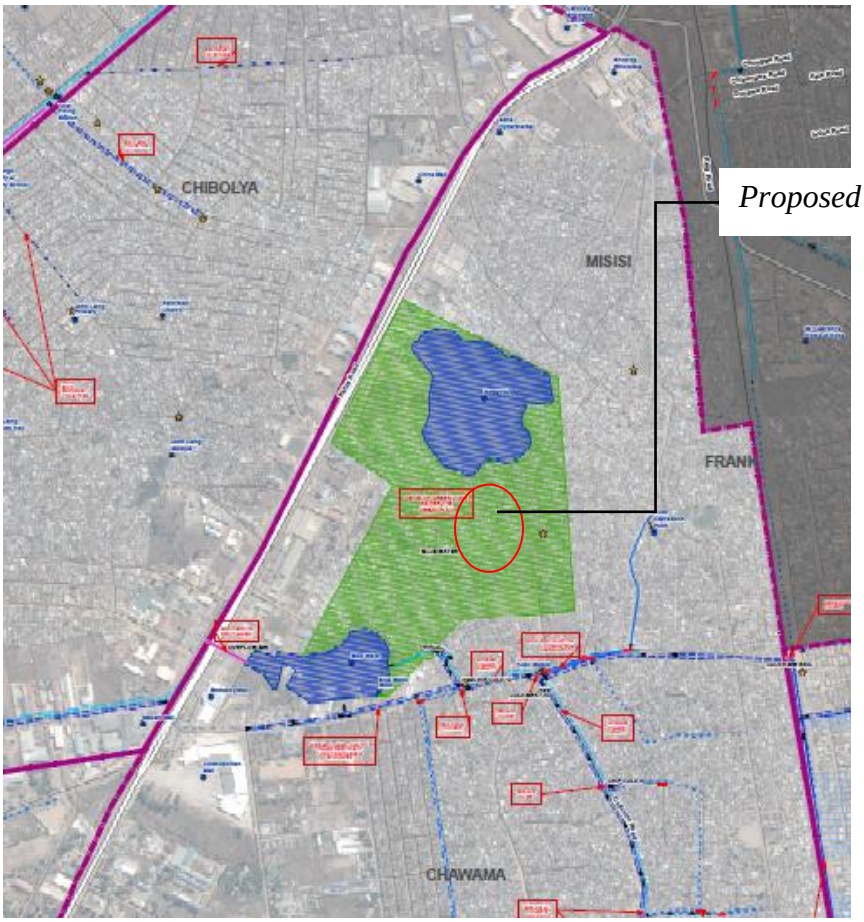


Figure 15: Proposed LCC interventions
Source: LCC, 2019

5.5.1 Conflicts of State Approaches with the Community

Misisi like any other settlement in a contested urban space has conflicts. The findings of the research reveal that conflicts do arise from the interventions of the state. It also shows that most state approaches to mitigate floods in the settlement are of a top-down authoritarian nature.

It was also noted that some people in the settlement oppose the building of the drainage systems along with their plots due to fear that the water from the drainage might cause their houses to be more flooded. This is because the community is not involved in making decisions. Decisions are usually imposed on them. The state treats the community members as passive victims and not as an important source of experiential knowledge that can help in reducing floods in Misisi. To this effect, a resident stated as shown in the quotes below:

These drainages have been built on a high ground compared to the level where our houses are built, such that when it rains heavily, water overflows from the drainages into our houses **(**Community resident, 10th April 2019: Personal communication).

Most people interviewed had not seen the importance of these drainages. As most residents discard solid wastes in them.

While Misisi is a flood afflicted area and the local residents have been afflicted by these flood for many decades, the vision of the central government has been to use the private sector to drive the urban renewal of the settlement. There exists utopian models for Misisi improvement. Another example of projects that have not been welcomed by the community in Misisi is the Misisi- Kuku Urban Renewal project (Figure 16) speared headed by the National Housing Authority to resolve the housing crisis for the locals and at the same time redevelop the whole Misisi - Kuku compound. Residents interviewed stated that they do not know about this project and those that had, stated that they did not welcome the project as they feared losing their houses and livelihood once the project was implemented.

Figure 16: Misisi-Kuku Urban Renewal Project
Source: National Housing Authority, 2019

5.5.2 Conflicts Resolution Strategies

Conflicts in the settlement are resolved through various structures, depending on the magnitude of the conflict. The research revealed that whenever there were conflicts at the community level the Ward Development Committee (WDC) and the area councillor deliberated over proceedings between aggrieved individuals. When a decision cannot be reached the police and council officials are engaged to solve these problems.

When conflicts are a result of state approaches to flood mitigation and the community, the WDC and the area councillor are there to resolve these problems. These conflicts often arise during the construction of roads and drainages as some houses are marked for demolition to pave way for their development.

> *We have an elected structure we work with on the ground that's the elected councillor and the WDC. As we work with people, conflicts are bound to come up but through these structures, some of the issues are sorted out at that level.* **(**LCC Official, 21st June 2019: Personal communication).

The results of the research revealed that local leaders are very cardinal in resolving conflicts emanating between the community and state approaches to flood mitigation in Misisi.

5.6 Conclusion

This chapter endeavoured to present the findings of this study in a more coherent manner. It drew its findings from data collected from in-depth and semi-structured interviews, non-participant observations and GIS modelling. In the next chapter, the foregoing findings of the study are discussed with the reviewed relevant literature concerning specific research objectives.

CHAPTER SIX: INTERPRETATION AND DISCUSSION OF FINDINGS

6.0 Introduction

This chapter presents a discussion of the findings of the study. The chapter relates the findings with conceptual debates from the literature review chapter. The aim is to advance conceptual debates and generate new insights on community-based adaptation initiatives and the clash of rationalities in urban interventions in Southern cities. The chapter consists of five sections. The first section presents the community governance systems for flood adaptation used in Misisi. While the second section provides for a discussion of the findings on community participatory flood mapping conducted during the study in Misisi. The third and fourth sections provide a discussion on community-driven adaptation strategies to mitigate flood risk and community conflicting rationalities with state approaches in Misisi respectively. The chapter ends with section five which provides a conclusion of the chapter.

6.1 Community Governance Systems for Flood Adaptation in Misisi

This study findings show that the Ward Development Committee (WDC) and the area Councillor are the main community governance structures for flood adaptation in Misisi. The WDC works hand in hand with the area councillor who acts as their link to the local authority (Council). The WDC acts as a link between the community members, the council and development agencies operating in the ward. It performs a critical role in flood risk management, as it organises the local community members and facilitate their participation in flood risk activities. It facilitates community participation and motivates people to work together and feel a sense of benefit and involvement. Despite having sub-committees as guided by the revised guidelines on the establishment of WDCs (GRZ, 2013a), the WDC in Misisi works as a unitary structure in mitigating floods. However, the community governance structure faces lots of challenges in facilitating flood adaptation in Misisi. Like Dickson et al. (2012) noted in their study which was conducted in informal settlements in Dar es salaam that there is inadequate human and financial resources to support climate change adaptation programmes in most developing countries as not many people have the adequate skills, qualifications and experience in climate change adaptation programmes hence lack effective delivery of significant contributions and outputs in climate change programmes. This was also the case with Misisi, the

major challenge of community governance structures found was that of inadequate finance to support flood adaptation programmes in the settlement. Support was only received once a disaster had occurred.

The second major challenge found was the spatial and geological composition of the Misisi informal settlement. Like Armitage (2011) and Salami et al. (2017) note, informal settlements in Global south cities are normally located in areas of inadequate or complete lack of urban drainage systems and hazardous spaces. These settlements also face challenges of blocked drainages as a result of indiscriminate disposal of wastes in drainages preventing water from leaving an area following heavy rains (Armitage and Rooseboom, 2000). Equally, the findings in this study show that Misisi as an informal settlement consists of unplanned, unregulated substandard houses that are mostly built on hazardous spaces. Because of its geology and spatial configuration of built-up structures, the community governance structure finds it difficult to provide drainages as it becomes a costly undertaking. Because of limited financial and technical capacity, the WDC is mostly inactive, unprepared and has limited capacity to prepare for, respond to or mitigate the effects of flooding in the settlement. Like the community in Muzarabani, in Zimbabwe, the lack of finances by the WDC leaves the communities with the sole responsibility to decide as individuals or households on what action to take in the face of rising floodwaters (Mavhura et al., 2013). It is therefore important that for community governance structures to be effective there is a need for external assistance such as relief, finances and qualified experienced human resources at the proper time which can play a pivotal role in determining the effectiveness of community adapting strategies. It is extremely vital to ensure assistance from government and NGOs during and after a flood to minimise the hardships that confront victims, and to help them to a swift recovery from a flood regain their pre-disaster status and move forward (Mavhura et al., 2013). It is also crucial to recognise and promote the protective quality of social capital alongside conventional structural and non-structural measures as this may provide critical support during and most notably after flood events. Further, for community governance structures to be more effective, community mobilisations need to be promoted where projects are planned carried out, and evaluated by community members.

6.2 Community Participatory Flood Mapping

The flood risk area map presented in this paper was made through participatory mapping with community members in Misisi. Similar to Goodchild (2007), the flood risk maps were produced by information provided by community members and leaders. The study was based on the premise that local inhabitants possess expert knowledge of their local environments which can be expressed geographically through maps that are easily understandable and universally recognised. The maps produced through community participation in this study represent a socially or culturally distinct understanding of landscape as a place in which they live and include information that is excluded from the mainstream or official maps. The higher the level of participation by all members of the community, the more beneficial the outcome because the final map will reflect the collective experience of the group producing the map. One crucial identified problem during the study was the lack of spatially explicit information of the infrastructures combined with a lack of hazard risk maps. Lack of up to date maps and current data of settlements and infrastructures can hinder better decision-making at all levels (Msilanga, 2018). From the study, it can be deduced that without the involvement of the community in flood risk mapping or any other forms of mapping, not much would be achieved in the development arena. Consequently, like Lydon (2002) and Yearley et al. (2003) note community, participatory mapping as a means of fostering inclusiveness and assist decision-makers as those involved are more likely to support decisions when they have been consulted and are less likely to oppose them. However, as much as this form of mapping is advocated for by many authors, Rundstrom (1995) states these maps must not be excluded from professional criticism to ensure that they conform to the acceptable standards of a map. It is for this reason that the data obtained from the community was integrated into ArcGIS to produce a professional map that shows the spatial distribution of floods in Misisi.

6.3 Community-Driven Adaptation Strategies to Mitigate Flood Risk in Misisi

The community in Misisi using experiential knowledge and skills has developed many autonomous adaptation strategies that have yielded positive outcomes, yet they are not adequate because when the floods are severe some people abandon their houses. This can be likened to similar studies conducted by Huq and Reid (2007) and Mavhura et al. (2013) which observed that flooding was a serious problem and that most adaptations strategies applied were

inadequate, not sufficient enough to overcome problems caused by frequent and excessive floods. These strategies also like Mavhura et al. (2013), observed were more effective in low magnitude floods, and when the flood magnitude become more community members were forced to temporarily leave their houses until a time when the flood levels reduced. Further, these adaptations required finances that the majority of the community members could not afford like constructing protective walls to prevent water from entering their yards. These community-driven strategies when properly invested in and improved, have the potential to fill gaps of top-down and centralised expert-driven solutions that have not yielded many positive outcomes in the settlement (Scolobig et al., 2015). It was observed that stakeholders only come on board whenever there is a flood disaster before then everything is left to the community members. As observed in the case studies reviewed (Reid, 2007 and Mavhura et al., 2013) external assistance such as relief at the proper time and appropriate distribution can play a pivotal role in determining the effectiveness of coping and adapting strategies. It is also important to ensure assistance from the government, NGOs and other stakeholders during and after a flood to minimise the hardships that confront victims and to help them to a swift recovery and regain their pre-disaster status. However, such assistance should incorporate local experiential knowledge and strategies on flood mitigation and should be consultative unlike the traditional forms of flood interventions that are top-down and non-consultative. When community-based adaptation strategies are adopted, developed and integrated into local government development plans and flood interventions they can yield positive outcomes and transform the community exposed to hazards such as floods to reach and maintain an acceptable level of functioning (Gunderson and Holling, 2001; Djordjević et al., 2011).

6.4 Community Conflicting Rationalities with State Approaches

The findings of the research revealed that there are several incidences of conflicting rationalities in Misisi involving state-led organisations that are active in flood risk management and the community. These conflicts are a result of the nature of state interventions, which as evident in the research findings are ‘top-down’ in nature with little community involvement in planning, implementation and decision making. The involvement of the local community members is important in flood resilience building at all levels of flood risk reduction. However, the local authorities and other organisations in Misisi do not usually engage the local people in

deliberations when decisions are made on the nature of intervention to be undertaken; as such, the community is largely on the receiving end. This study further showed that top-down decision-making processes and assertion of authority by government agencies are dominant features of flood risk management in Misisi informal settlement. This is similar to the findings of Mercer et al., (2008) and Bakker et al., (2008) who stated that state interventions to floods have taken a top-down approach and have been driven by professional experts using engineered solutions to mitigate against floods. Heijmans (2004) also notes that state interventions usually view people affected by disasters as being vulnerable and passive victims or recipients of aid and not as potential resources for development, capable of sustaining their livelihood. Usually, these solutions often fail because they are implemented without input from local communities. Similar to Botha and van Niekerk (2013) study on high-risk communities in South Africa, the residents interviewed also felt 'that the government follows a top-down process with local government officials telling community members what to do, but not asking community members what they think should be done'. For example, during the construction of drainages in Misisi there was very little community involvement. The government followed a top-down approach with local government officials telling community members what to do, but not asking community members what they think should be done about floods in Misisi. The nature of interventions by the state like Watson (2003) states have resulted in rationalities where state officials and community members, are often located at opposite ends of the continuum with little or no common ground. The positive impacts of both the state and community are limited by these differences. Therefore, disaster mitigation strategies need to involve the community to avoid them from being turned down or under-appreciated by the community because of too broad a gap existing between "professional esoteric knowledge and local experiential knowledge" on disaster mitigation. For the urban poor, understanding what the state can and cannot provide and what its constraints are is the first step to building resilience.

6.5 Conclusion

This chapter looked at the research objectives concerning literature and the study findings. It points out the importance of community participation and involvement as an important component of climate change vulnerability reduction and adaptation.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.0 Introduction

This study was aimed to examine the rationalities that influence the implementation of community-based adaptation strategies to flooding in Misisi. The specific research objectives of the study were to i) investigate the role of community governance structures for flood adaptation in Misisi; ii) spatially identify flood risk areas in Misisi using community knowledge; iii) identify community-driven adaptation strategies to mitigate flood risk in Misisi; iv) critically examine instances of differences between community and state approaches to urban flood risk mitigation in Misisi. The study utilised a case study approach in the flood-prone urban local community. Empirical evidence was captured using semi-structured interviews with flood-affected households in-depth interviews with ward leaders, and state officials and mapping of zones by the severity of flooding to elicit vital information that relates to the study's objectives. The data was analysed using descriptive statistical methods, content and narrative analysis. The chapter consists of two sections. Section one provides the conclusion of the study. The chapter ends with section two which presents recommendations based on the conclusions of the research.

7.1 Conclusions

The study revealed that effective community governance structures are essential to the success of community-based approaches to climate change and disaster risk management. However, the study revealed that governance structures in Misisi had some weaknesses in flood disaster management as a result of the challenges they are facing. Once remedies to these challenges are provided, the WDC in collaboration with other stakeholders can help the residents of Misisi to best handle the hazards that exist in their communities and facilitate their meaningful participation in the process from project planning to implementation. This helps provide a sense of belonging and ownership of the project to community members. Similarly, community participation in the mapping of flood risk areas in the settlement should be promoted as this will help improve decision making about disaster management and mitigation in Misisi. The process of mapping is also essential for the community as it can be used as a tool to learn about local flood hazard risk and adaptation.

It is also clear from the study that floods negatively affect the livelihoods of people in Misisi. However, despite the likelihood of occurrence of annual floods, people in Misisi have resisted migrating and have adapted to changing situations using structural and non-structural adaptive strategies. From the study, it was clear that households adapt differently when affected by floods due to factors such as income, education and flood height among others. However, such strategies are highly effective only in low magnitude floods, when floodwaters rise and cross a critical threshold; people have no choice but to temporarily abandon their homes to safer places. This study also revealed that community adaptations have not been recognised by state agencies such as local authorities as they have been neglected and not factored into local government development plans and state interventions. Local experiences and historical processes that have been used to mitigate floods by the community have been ignored. The local communities adapting capacities should not be underestimated but rather built upon.

The study has further shown that several incidences of conflicting rationalities in Misisi are a result of the nature of state interventions, which as evident in the research findings are 'top-down' in nature with little or no community involvement in the decision-making process. This has resulted in some residents resisting development in the area, as they believe they will lose their houses. Lack of community involvement in flood mitigation programmes has resulted in projects being rejected by the community. This has also contributed to the reactive response to present flood impacts. Meanwhile, proactive implementation of measures to reduce flood risk seem to be more effective and less conflict-laden.

This research finally concludes that informality is a reality of contemporary cities and for urban planning and state approaches to disaster management to contribute meaningfully to the fastest growing form of urbanisation and increased climate vulnerability, they must break through conventional predominantly top-down, 'command and control' approaches, to the encouragement of 'people-centred' approaches and local participation. The need to create synergies between state agencies and the public is an added value for promoting community-based adaptation and community resilience to hazards and disasters.

7.2 Recommendations

This study leads to the following recommendations to enhance the adaptive capacity of the urban poor and state agencies to adapt to present and future floods:

i. There is a need for the state through various state agencies such as DMMU and the local authority to empower communities through capacity building to enhance proactive action towards flood resilience in the settlement. This should also include building local skills and capacity for community feedback mechanisms during flood disasters.

ii. To avoid conflicts in flood management there is a need for DMMU and the local authority to establish an integrated flood management approach and joint actions that promote the involvement of all related stakeholders, especially the community.

iii. There is a need for DMMU and the local authority to promote community participation in flood disaster mitigation decision-making processes as this may help to develop mitigation strategies that will both fit into the local context and be accepted by the community.

iv. Participatory mapping of all flood-prone and hazardous areas in the city should be carried out and continuously updated by the local authority with the help of community members. The maps should contain detailed information on flooding and hazards. Accurate and reliable data can be obtained by actively involving the residents as partners in data collection. Photographs and other user-friendly illustrations could be used. The maps and other materials should be widely disseminated to all stakeholders.

v. There is a need to research the effectiveness of Government institutions in building flood resilience in Zambia. Further research can also include the impact of floods on people's livelihood in informal areas.

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APPENDICES

Appendix A: In-Depth Interview Guide for Organisations

Name of Interviewer: Date of Interview:

Dear Respondent,

I am a postgraduate student at the University of Zambia pursuing a Master of Science in Spatial Planning Degree. I am conducting research entitled, **"Rationalities of Community Based Adaptation Strategies to Urban Floods in Misisi informal settlement in Lusaka."** Kindly feel free, open and honest in your responses as all answers you give will be confidential. However, should you feel uneasy at any point in the interview you are free to state so and may wish to withdraw?

1. Gender…….
2. Name of Institution or Community/ or group……..
3. Position……
4. The number of years/months in this position/community/group……..
5. What role do you play as an institution in urban flood mitigation?
6. Do you also operate in Misisi?
7. Do you have sub-level local representation in the settlement to organise people on the ground?
8. What adaption strategies has your institution developed to mitigate floods in Misisi?
9. How different are they from what the community is doing?
10. Do you think the current adaptation strategies are adequate to mitigate floods in Misisi?

11. What are some of the challenges you are facing as an institution to respond to floods in Misisi?

12. What other stakeholders are involved in flood adaption and mitigation in Misisi?

13. Have there been instances of differences between the approaches your institution is using to mitigate against floods in Misisi and community approaches?

14. How are conflicts managed to ensure progress in flood mitigation in Misisi?

15. What possible ways can your collaboration with the local people be improved?

16. Does your institution have floods maps showing which areas moderately floods and severely flood?

17. If 'yes', has the community been involved in producing these maps?

18. What long term measures has your organisation put in place to address the issue of floods in Misisi?

19. Was the community consulted on strategies used and about disaster preparations?

20. Does your organisation sensitize community members about strategies of mitigating against floods?

THANK YOU

Appendix B: Semi-Structured Interview Guide for Community Residents Affected By Floods in Misisi Settlement

Name of Interviewer: Date of Interview:

Dear Respondent,

I am a postgraduate student at the University of Zambia pursuing a Master of Science in Spatial Planning Degree. I am conducting research entitled, **"Rationalities of Community Based Adaptation Strategies to Urban Floods in Misisi informal settlement in Lusaka."** Kindly feel free, open and honest in your responses as all answers you give will be confidential. However, should you feel uneasy at any point in the interview you are free to state so and may wish to withdraw?

Section A

Biodata/Personal Information

1. Gender (a). Male (b). Female ☐
2. Age …….
3. Marital status? (a). Single (b). Married (c). Divorced (d). Widow (e). Widower ☐
4. How long have you lived in this community? ……..
5. Level of Education? (a). Primary (b). Secondary (c). Tertiary (d). None ☐
6. What is your occupation? .....
7. What is your monthly income level in Kwacha?
   (a) Less than 1 -1000 (b). 1001- 2000 (c). 2001-3000 (d). 3001-4000 (e) Above 4000 ☐

General Property Information

8. Firstly, was your property directly affected by the flooding?
   (a). Yes (b). No ☐
9. Home ownership? (a). Owned (b). Rented ☐
10. Are you considering moving to other areas to avoid floods? (a). Yes (b). No ☐
11. If 'No to question 10' why don't you want to move?

    ……

    ……

Section B

Part 1: Role of Community Governance Systems in Flood Adaptation in Misisi

12. Are there people who help you manage floods in your community?

    ……

13. If 'yes to question 12' who are the key players in managing flood in your community?

    ……

    ……

    ……

14. Are you willing to participate in any community-driven flood control programme in your community?

    (a). Yes (b). No ☐

15. If 'No to question 16' why are you not willing to participate in any community-driven flood control programme in your community?

    ……

    ……

Part 2: Participatory Mapping

16. Does any organisation involve you to participate in mapping flood-prone areas?

    (a). Yes (b). No ☐

17. If 'yes to question 21' please state which organisation?

    ……

    ……

18. Do you know the flood level at peak? (a). Yes (b). No ☐

19. If yes, what is the height from the ground? ……Meters.

20. The coordinates of the house Eastings: …… Northings: ……..

21. How severe where the floods? (a). Not Severe (b). Moderate (c). Extreme ☐

22. In case of flooding, how long does it take for the floods to reach their peak after the rain pours? (a). in less than 30 minutes (b). 30 min to 1 hour (c). More than 1 hour (d). Not sure ☐

Part 3: Community Adaptation Strategies

23. What strategies do you and your family employ to avoid floods when they strike?

    ……

24. Please rank the strategies mentioned in question 29 in order of importance?

    ……

    ……

25. Do you think the current adaptation strategies you use are adequate to mitigate against floods?

    (a). Yes (b). No ☐

26. If 'No to question 31' why don't you think they are adequate?

    ……

    ……

27. How do floods affect you?

    ……

    ……

28. What are some of the challenges you are facing to respond to floods?

    ……

    ……

4: Instances of Difference between the Community and State

29. Have there been instances of conflict between the community approaches and the state approaches in flood mitigation in Misisi?

    (a). Yes (b). No ☐

30. If 'yes to question 34' what do you think has led to these conflicts?

    ……

31. What do you think can be done to avoid or overcome these conflicts?

    ……

THANK YOU