

LINKING LOCAL CLIMATE CHANGE INSTITUTIONAL COORDINATION TO
CLIMATE CHANGE ADAPTATION AMONG SMALLHOLDER FARMERS IN MKUSHI
DISTRICT, ZAMBIA.

By

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A dissertation submitted in partial fulfilment of the requirements for the Masters of Science in
Environmental and Natural Resource Management.

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ABSTRACT

The reduced budget allocation to agriculture in the context of climate change has contributed to the failure of many institutions to carry out adaptation activities to ensure food security for smallholders in Zambia. The purpose of this study was to examine the effectiveness of local institutions in coordinating climate change activities for adaptation of smallholder farmers in Mkushi district. The study was conducted in the Musofu and Nkumbi area of the Mkushi District with a sample of 144 smallholder farmers and 16 key informants from various establishments. The data were collected using structured interview guide and semi-structured questionnaire. The data were analyzed using a combined quantitative and qualitative approaches. The Chi-square was employed for the analysis of quantitative data and thematic analysis of the qualitative data. Literature reviewed did not present studies that linked local climate change institutional coordination to climate change adaptation in Mkushi district. The survey discovered that the effects of climate change on smallholder farmers included poor agricultural yields and crop wilting. However, the findings revealed that there are gaps in legislation for effective coordination of adaptation activities with 56.3 percent indicating that the gaps are at the national level. To measure perceived effectiveness of institutions in coordinating climate change activities the researcher used the following markers; (1) training of farmers; (2) advancement of conservation farming; (3) promotion of horticulture and drought tolerant crops; (4) encouraging climate smart agriculture and crop diversification; (5) Funding of affected communities; and (6) mobilization of funds. The study found that farmer training in climate change adaptation was perceived not to be effective by the key informants ($X^2 = 2.000$; $df = 2$; p -value = 0.368) while for farmers it was effective ($X^2 = 36.833$; $df = 4$; P -value=0.001). Promotion of conservation agriculture by government institutions was perceived not to be effective by key informants ($X^2 = 6.500$; $df = 4$; P -value=0.165) while for farmers it was effective ($X^2 = 31.625$; $df = 4$; P -value=0.001). The promotion of horticultural and drought-tolerant crops was not effective by the key informants ($X^2 = 7.125$; $df = 4$; P -value=0.129). For farmers it was effective ($X^2 = 36.92$; $df = 4$; P -value=0.001). Further, encouraging of climate-smart agriculture was also considered not to be effective by farmers ($X^2 = 2.125$; $df = 4$; P -value=0.713). For farmers it was effective ($X^2 = 45.497$; $df = 4$; P -value=0.001). Mobilization of funds for affected communities and financing were not effective by both key informants ($X^2 = 38.171$; $df = 4$; P -value=0.002) and farmers ($X^2 = 47.181$; $df = 4$; P -value=0.001). Overall, the coordination of climate change adaptation to smallholder farmers in Mkushi was moderately effective due to the absence of NGO support, and lack of financial support to the ministry of agriculture. The inadequate human resources, lack of adaptation capacity and specialized officers, and institutional failure to mobilize funds. Reduction of budget allocation to the ministry of agriculture and the labor intensity of conservation farming are major effects rendering institutional climate change adaptation activities to be ineffective in Mkushi District. To ensure smallholder food security, climate change coordination should be scaled up locally to enhance adaptation through increased funding and capacity building. Policies should be commensurate with the financial allocation and decentralization of institutions to enable an effective bottom-up system of adaptation planning. The policies must be enacted into laws so as to enhance implementation of climate change adaptation by the establishments, thereby making smallholder farmers adapt the sustainable climate change adaptation.

Keywords: *Adaptation, Mitigation, Climate Change Adaptation Activities, Climate Change, Institution, Public Private Partnership*

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LIST OF ACRONYMS AND ABBREVIATIONS

CCA	Climate Change Adaptation
CCNRMD	Climate Change and Natural Resources Management Department
CPDMMUC	Central Province Disaster Management and Mitigation Unit Coordinator
DACO	District Agriculture Coordinator
DMMU	Disaster Management and Mitigation Unit
E.C.Z	Environmental Council of Zambia
GRZ	Government Republic of Zambia
MACO	Ministry of Agriculture and Cooperatives
MKDC	Mkushi District Council Officials
MLGH	Ministry of Local Government and Housing
MOF	Ministry of Finance
MPND	Ministry of Planning and National Development
MTENR	Ministry of land Environment and Natural Resources
NAPA	National Adaptation Program of Action
NGO	Non-Governmental Organization
PAC	Provincial Agriculture Coordinator
PPCR	Pilot program for Climate Change Resilient
UNDP	United Nations Development Program
UNFCCC	United Nations for Convention on Climate Change
ZMD	Zambia Meteorological Department
ZNFU	Zambia National Farmers Union

CHAPTER ONE: INTRODUCTION

1.0 Background to the Study

Climate change affects every sector of the global economy and slows down socio-economic development. The need for adaptation and mitigation measures to avert the impacts on human infrastructure, and economic sectors are a recurring subject of global discourses (Hovik *et al.*, 2015). Climate induced hazards such as droughts, floods and extreme temperatures have increased in frequency and intensity over the past few decades and have adversely affected the food security and sustainable livelihoods of the rural communities (GRZ, 2016). Climate patterns play a fundamental role in shaping natural ecosystems, and the human economies and cultures that depend on them. The change in climate has affected various people, plants and animals' life. These include food production, availability and use of water, and health risks, thus the agenda being so high on the Inter-Governmental Panel on Climate Change (IPCC), United Nations Framework Convention on Climate Change (UNFCCC) and many other world fora's (Limaye and Zhu, 2012). Climate change adaptation needs financing which is critical to addressing climate change because large-scale investments are required to significantly reduce emissions, notably in sectors that emit large quantities of greenhouse gases and to adapt to the adverse effects and reduce the impacts of climate change through technological, human skills and well-coordinated institutions (Alkaya *et al.*, 2015).

The United Nations Framework Convention on Climate Change (UNFCCC) has estimated that global additional investment and financial flows of United States Dollars 200–210 billion annually will be necessary by 2030 to return global greenhouse gas (GHG) emissions to current levels (UNFCCC, 2007). This estimate includes mitigation and adaptation actions in both developed and developing countries. The convention established a financial mechanism to provide financial resources to developing countries. During the Paris agreement in 2015, developed countries committed themselves to jointly mobilize US\$100 billion a year by 2020 to address the needs of developing countries. This saw many of the public financing sources seek to leverage increased financing from private sources (Funder *et al.*, 2018). To accomplish this, a number of Public-Private Partnerships (PPPs) have been established. PPPs are designed to leverage private flows to fill funding gaps, transfer service delivery risks, and improve the cost effectiveness of service delivery for sustainable development (Charles, 2013).

The effects of climate change compromises food system functionality by contributing to water scarcity and the pest exacerbation (Sunrendra and Elaine, 2018). The change in rainfall pattern, droughts and high temperatures, makes the exacerbation of pests such as the bore worms, and the current fall armyworms that has affected the agricultural sector in many sub-Saharan African countries and Zambia inclusive to reduce food production for many vulnerable communities (Mulenga *et al.*, 2015). Hence the need to have good sound local institutional climate change mechanisms for adaptation, which will minimize the shocks caused by the extreme climate changes. While African agriculture has been dealing with these effects of climate change for decades, in the 2016/2017 agriculture season, a relatively new problem in the sub-saharan Africa to the African agriculture was introduced, the fall armyworm (*Spodoptera frugiperda*). The African armyworm (*Spodoptera exempta*), first described by Francis Walker in 1856, has been an important pest of pastures and cereal crops in Africa for over a century (SADC, 2017).

The African agriculture is adapting to the African armyworm (AAW) invasion, as well as the invasion of other pest endemic to the continent, the fall armyworm (FAW) invasion during the 2016/2017 agriculture season was an unfamiliar threat in southern Africa. The optimum temperature for larval development is 28°C, but is lower for egg laying and palpation (Sunrendra and Elaine, 2018). In the tropics, breeding may be continuous with four to six generations per year. The severe outbreaks usually coincide with the onset of the wet season, especially when the new cropping season follows a long period of drought. The FAW provides an example of the need for functional, effective and flexible local climate change institutional coordination that should be able to robustly handle these effects of climate change and spur national climate change adaptation (Choy, 2012).

With the effects of climate change increasing, FSP and FISP were intended to be climate smart institutions that would contribute to combating the effects of climate change on smallholder farmers (Umar *et al.*, 2012). The FISP, in its right should have broadened the giving of high tolerant to drought seeds of various crops, and also promote the conservation type of farming and then help in the sourcing of pesticides and weed killers which can eradicate and minimize the pests that come about due to drought and dry spells. Its core was to increase food security for smallholder farmers. Chipso (2013), despite the diversification of the inputs, there has been less information on the cost of adaptation, labor for the smallholder farmers to cope up with the

climate change and the financing to implement the aspirations of climate smart agriculture. Vulnerability of agriculture can be reduced through adaptation measures to cope with the increasing climate variability (EU, 2007; Faustino, 2007).

An institution is an organization mandated with the responsibility of overseeing access, management and utilization of resources that oversees policy implementation and regulations governing resource, utilization and ensuring resources reach intended beneficiaries (Mubanga, 2016; Muchanga, 2011). Besides FISP, another institution that has significance in the agriculture sector is the Food Reserve Agency (FRA). Prior to liberalization in the 1990s, maize marketing was controlled by the government agricultural marketing parastatal, the National Agricultural Marketing Board (NAMBOARD), which set pan-territorial or pan-seasonal producer prices for maize and handled Government Republic of Zambia (GRZ) maize imports and distribution. Private inter-district trade of maize was prohibited (Govereh, et al, 2008). The FRA was established by Government Republic of Zambia in 1996 after the enactment of the Food Reserve Act of 1995. The FRA's original mandate was to establish and administer a national food reserve (GRZ, 1995). Private maize trade remained legal but buffer stocks held by the FRA were intended to reduce maize price variability and to provide liquidity in the maize market as the private sector established itself in the early years of market liberalization (Holden and Lunduka, 2013). Established by Government Republic of Zambia (GRZ) in 1996 as a national food reserve, the FRA's mandate was expanded in 2005 to include crop marketing. The Agency's stated objective is to "contribute to the stabilization of national food security and market prices of designated crops," although its focus has been almost exclusively on maize. In 2006 and 2007, spending on the FRA accounted for approximately 26 percent of total government, agriculture-related expenditures (Govereh *et al.*, 2009). By increasing the funding and making efficient in the procurement of maize from smallholder farmers, this may help in overcoming the failures by FRA at the same time make it climate smart by putting mechanisms in place which will facilitate adaptation to impacts of climate, like buildings for storage of the grain and the unprecedented onset of rains before transportation of the maize to district FRA depot.

Climate change adaptation needs a structured movement of assets such as technologies, machinery and skills from developed economies to projects in emerging economies in least developed and developing countries (IPCC, 2007) and this calls for well-coordinated and

functional institutions which is through government, or Non-Governmental Organizations which have structures in local communities. These assets are meant to encourage carbon neutrality, sustainable development or other practices that will lead to mitigation and adaptation of climate change impacts. Climate change adaptation requires the local institution, national or transnational coordination of public and private to mobilize resources that seeks to support mitigation and adaptation actions that will address climate change. Vincent, (2012) reported that, the Kyoto Protocol and the Paris Agreement call for financial assistance from Parties with more financial resources to those that are less endowed and more vulnerable. These funds can be mandated by and funneled through non-governmental organizations (NGOs), individual governments or private investment. The coordination is done by the identification of communities which are vulnerable to climate change variabilities.

Local institutions are cardinal in climate change adaptation coordination as they spearhead and coordinate the implementations and dispensation of funds to projects and help in monitoring and evaluation of projects (Mertz *et al.*, 2009a). They are conduits in which government depends on making radical decisions and formulate policies, statutory instruments and laws that help in adaptation of climate change impact in decision-making by improving the knowledge upon which it is premised. However, the institutions will manage the coordination of climate change if there is adequate funding, capacity building especially at local level, and laws enacted. If not, then they will fail. Local institution helps in the identification of impacts of climate change and the flow of resources. They also help in timely warnings and recommending adaptation strategies or mechanisms in adapting to climate change variabilities (UNEP *et al.*, 2010). Developing countries like Zambia needs to strengthen national institutions' systems to manage climate change coordination of which the assessment processes have always been not well linked to local climate change institutional coordination for decision- making. Further, the institutions should have laws that guide their operations in CCA and this will enhance their roles in coordinating their CCA activities. Therefore, better systems to track institutional climate change adaptation and efficiency as the financing trickle in whether at local level may significantly lead to strengthen their effectiveness if they align the strategies and mechanism for climate change adaptation within the priorities of community needs (Jesse, et al., 2014).

1.1 Problem Statement

In Zambia, institutions that are expected to play a key role in managing and coordinating climate change adaptation efforts in local areas are weak. This is due to the lack of explicit or clear institutional arrangements that encourage the participation of the community and other institutions in the coordination of climate change, although the impacts are of a different magnitude (Cycle Programme Report, 2018). The CCA coordination by institution is weak and the ineffectiveness is attributed to failure by institutions to enforce (policies) or coordinate due to lack of human resource at district or ward level. This challenge is not just a problem in Zambia. The IPCC, (2012) reported that for most Third World states, institutional frameworks still fall far short of the requisite capacity building, under-resourced and fragmented to effectively coordinate implemented initiatives. This makes it difficult to implement climate change strategies at a national level. Such a lack of institutional arrangement contributes to the failure in bringing cohesion to the current institutions already in a position to support adaptation programmes (IIED, 2016).

Central government in Zambia underfunding of institutions presents a challenge to effectively coordinate climate change projects. Because of this, it makes local institutions fail to coordinate climate change adaptation activities as resources scarce relative to the needs and wishes of the effects of climate change variabilities in communities (UNDP, 2014). However, the limited resources allocated to climate change, coordinating institutions in Zambia do not improve their ineffectiveness. For example, since the beginning of 2019, the Climate Change Department, which is responsible for coordinating climate change activities in Zambia with few or no personnel in other districts especially at grass root level, has not received government funding to improve its operations. The lack of funding makes them highly ineffective in carrying out their coordination activities. In addition, institutions may lack skilled staff in climate change-related activities, making it inefficient. Jackson, (2013) the coordination of institutions can be heightened if there are inspectors in monitoring the climate change activities from the national to the local level in order to improve efficiency and potency.

There is a general lack of cooperation and coherence among different sectors and departments dealing with climate change issues which may be caused by lack of trained human resources and unqualified personnel coordinating climate change activities (Funder *et al.*, 2015). The multi-

sectoral nature of impacts and adaptation to climate change calls for promotion of coherence and synergies between adaptation programmes. Then also between institutions with responsibility for adaptation by different ministries whose institutions should have climate change human resource, inspectors with high compliance streaming down to local level (GRZ, 2016). At times the seeming breakdown in cooperation is due to the fact that the roles of institutions in coordination of multi-sectoral adaptation related climate change are unclear. As a result, the coordination of CCA in Zambia is weak and in Mkushi it is not there compared to other districts. This is because there is no promotion of coherence and synergies between adaptation programmes and between institutions with responsibility for adaptation making it difficult to account for adaptation projects either by civil society, NGOs or private sectors. In Mkushi there is weak coordination of CCA activities due to the limited presence of institutions dealing in climate change and hence lacking the adaptation capacity despite being affected by the climate change variabilities.

1.2 Aim

The aim of this study was to examine the effectiveness of local institutions in coordinating climate change agricultural activities for adaptation in Mkushi District.

1.3 Objectives

The objectives of this study were;

- (i) To explore loopholes in the legislation on the coordination of climate change activities in Mkushi.
- (ii) To examine the role of institutions in coordinating climate change activities for adaptation in Mkushi.
- (iii) To rank the level of effectiveness of climate change coordination from the key informants' point of view.

1.4 Research Questions

The study answered the following research questions:

- (i) What key institutions steer the coordination of climate change activities for adaptation in Mkushi?
- (ii) What are the roles, institutions playing in coordinating climate change activities for adaptation in Mkushi?

- (iii) What are the problems in the legislation in the coordination of climate change activities in Mkushi?
- (iv) How effective are the institutions in climate change coordination for adaptation in Mkushi?
- (v) What are the challenges faced in adapting to climate change?

1.5 Hypothesis

H₀: The local climate change institutional coordination for climate change adaptation in agriculture sector is effective.

H₁: The local climate change institutional coordination for climate change adaptation in agriculture sector is not effective

1.6 Significance of Study

Climate risks need to be integrated into national development projects and strategies and this will require greater institutional capacity. With a few exceptions, most national policy makers are largely unaware of the potential impacts of climate change in different sectors as institutions consider climate change using different lenses. For instance, the Ministry of Finance focuses mainly on disaster risk management and more on economic growth, framing the environment as a reservoir of “natural resources which could provide an impetus to economic development” (MOFNP, 2011).

By contrast, the Ministry of Environment proposes a more holistic perspective, and speaks of a more equal and sustainable management of resources. On climate change, it mentions that “the mission is to ensure that the most vulnerable sectors of the economy are climate proofed” (MTENR, 2010). As seen in the National Adaptation Programme of Actions (NAPAs), which alongside other national strategies and plans could help bring knowledge on climate change impacts and adaptation into national policy and planning processes, mainstreaming climate change risks into development policy (such as Poverty Reduction Strategy Processes) Chipso (2013) and practice is needed, this demands a more strategic approach. Ensuring the country adapts well to climate change goes well beyond the need to ensure that individual projects are climate proof, but meet the aspirations of the seventh development plan, Vision 2030, and the Sustainable Development Goals (SDGs). Vulnerability can be reduced or increased by the choice

of development path, especially if the local institutions are sidelined and not integrating their knowledge of the adaptation strategies (IPCC, 2014). Therefore, each sector needs its own plans and institutions to ensure adaptation is both mainstreamed into development and factored in at a strategic planning level both of which demand funding. Because the poor will suffer most from many adverse climate change impacts, therefore, adaptation at the local level is essential.

Climate change models at local and often national level are not very accurate. But a community that is vulnerable to current climate variability is likely to be vulnerable to future climate change, so it is not always necessary to wait for more accurate local forecasts to start building adaptive capacity (Rosemary, 2011; Hannah, et al., 2010). Strengthening community, institutions to help them provide social safety nets and develop new coping mechanisms is a key way forward. Hence, once the local institutions are linked to climate change institutional coordination to climate change adaptation, then will the gaps in the national climate coordination be strengthened, as the integration will bring about the mechanism in coping up with climate change impacts and information sharing. Therefore, this research proposes that it will add to the knowledge on adaptive measures, by informing policy makers through a well-coordinated local institutions as key players in climate change adaptation with various stakeholders as local institutions play a crucial role in shaping adaptation to climate change through connecting households to local resources and collective action, determine flows of external support to different social groups and link local populations to national intervention. The policy formulators, stakeholders and the communities will benefit from the results if implemented will save the future generations in addressing CCA.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

Adaptation is defined as “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC, 2012, p. 5). According to IPCC (2014), adaptation is defined as the process of adjustment to actual or expected climate and its effects. In the face of unpredictable climate change, FAO (2014) holds that adaptation strategies are critical in agriculture in order to adjust to new environmental conditions such as. High temperatures, droughts and floods. According to UNFCCC, 2007) Climate Change refers to the change in weather statistics (precipitation and temperature) over a long period of time, usually 30 years and above. Climate change financing is financing channeled by national, regional, and international entities for climate change mitigation and adaptation projects (Charles, 2010; UNFCCC, 2012). Institutions are formal or informal organization structures which operate in the society by following norms, rules, values, culture and the political system of such a society. Deagan (2014) and Mubanga (2016) state that an institution is comprised of regulative, normative and cultural cognitive elements that together with associated activities and resources provide stability and meaning to social life.

2.1 Theoretical Framework

The study is premised on the institutional theory because institutions have to interact with its surrounding social system structure and operate in the society. Meyer and Rowan (1997) affirm that, institutional theory is a theory on the deeper and more resilient aspects of social structure. It considers the process by which structures, including schemes, rules, norms, and routines become established as authoritative guidelines for social behavior. DiMaggio and Powell (1995) Different components of institutional theory explain how these elements are created, diffused, adopted, and adapted over space and time and how they fall into decline and disuse. The transmission of the institutions' systems is of various types including; Symbolic, relational system, routine and artifacts, even though they operate at different levels of jurisdiction, from the world system of localized interpersonal relationships to incremental and discontinuous. Scott (2004; 2008) institutional theory emphasizes rational myth isomorphism and legitimacy, that are institutions imitating rather than necessarily optimizing their decisions, practices and structure organizations adapt other organizations way of conducting activities in a particular community

for conformity. Kraft and Furlong (2007) argue that, institutional theory is policy making that emphasizes the formal and legal aspects of government structures. Therefore, institutions form their operating parameters on the laid down laws or policies and thus their effectiveness borders on financial, personnel capacity and roles in a particular community.

Meyer and Rowan (1997) argue that, the cognitive and cultural explanation of social and organizational phenomena by considering the properties of supra individual units of analysis that cannot be reduced to aggregations or direct consequences of individual attributes or motives. Scott, (1995) indicates that in order to survive, institutions must conform to the rules and beliefs. Systems prevailing in the environment, both structural and procedural will earn the institutional legitimacy. Social, economic and political factors constitute an institutional structure of a particular environment which provides it with advantages for engaging in specific types of activities. Hence, they thrive if they receive the institutional support. Therefore, the legislations are made by institutions and it is these institutions that help in enforcing the laws made, that is coordinating and thereby being involved to see to it whether they are effective or not. It is on this ground that this study fits and used this framework.

2.2 Impacts of Climate Change on Agriculture

Carol *et al.* (2015) observed that the global climate change will continue to change at the rates projected to be unprecedented in recent human history and the risks associated with these changes are real but highly uncertain. The societal vulnerability to the risks associated with climate change may exacerbate ongoing social and economic challenges, particularly in those parts of societies dependent on resources that are sensitive to changes in climate. Annaka and Pieter (2013) contended that the impacts of climate change on agriculture production in Africa are a worrying concern given that 70 percent of the continent's population derives its livelihoods directly from rain-fed agriculture. The risks posed by climate change further threaten all the agriculture dependable livelihoods, especially among the rural communities. Zambia has not been spared by the effects of climate variability and it has threatened its national target of becoming a middle income nation by 2030 (Morey and Zhao, 2015) and meeting the Sustainable Development Goals.

As a result of climate change and variability, southern Africa is set to be characterized by extreme conditions. Chipo (2017) believes that Southern Africa is projected to get drier and experience more extreme weather conditions, particularly droughts and floods. Chipo (2017); Khatri, et al., (2013) explained that, climate risks are acknowledged to be a serious threat to smallholder farmers' livelihoods and the risks do not exist in isolation, but rather compound a multiplicity of stressors in which finances must be readily available for adaptation. It is evident that climate change threatens the lives and livelihoods of every sector with different magnitude, and basic subsistence of human populations and communities all over the world. Sea level rise is accelerating and is expected to worsen over the next century due to increased rates of ice sheet mass loss from Antarctica causing disastrous floods like the recent tropical cyclone Idai in the Southern Africa, which affected both human life and their livelihoods in Malawi, Mozambique, Zimbabwe and South Africa (Guardian 2019). The impact of cyclone Idai was reported to affect at least 83,318 hectares of crop area were flooded, affecting 54,853 smallholder farmers (UN RC, 2019).

Grannis (2011) argued that climate change disrupts economic activities and livelihoods and people will be highly likely to lose their crops, livestock, homes and the land in many parts of the world especially in weak economies. In Zambia, for instance, the impact of drought on agricultural production during the 2014/2015 farming season was substantial (Wise *et al.*, 2014; Lumosi, 2014). This was not the loss in the volume of agricultural production only, but also the individual farmers' income loss more especially the smallholder farmers who are more vulnerable with little or no adaptive capacity and lack finances. In Zambia, inadequate finances, irrigation systems, lack of insurance, limited access to climate information and low adoption of climate smart practices particularly compromise smallholder farmers' adaptive capacity to climate change impacts (Mubaz, 2017). Therefore, adequate financing to the agriculture sector among the smallholder farmers would enable them to adapt and build resilience to climate change effects.

2.3 Climate Change and Climate Financing

With the visible global devastating impacts of climate change in all the sectors of the economy and dependable livelihoods, financing to combating its effects remains crucial at all levels, yet the adaptation to the impacts of climate change remains to be an expensive venture especially for

developing countries. To this effect, researchers have had varied estimates regarding the cost of adaptation in developing countries per year. For instance, Parry *et al.* (2009) estimated at least USD 100 billion per year by 2030, Narain *et al.* (2011) estimated USD 70–100 billion per year in the period 2010 to 2050 while UNEP (2014) is between USD 140 and 500 billion annually.

Most developing countries depend on climate financing through Multilateral and bilateral Climate Financing Corporations. In 2009 developed countries pledged to provide USD 30 billion for the period 2010 to 2012 and committed to mobilizing USD 100 billion per year by 2020 in funding for developing countries. Scoville-Simonds (2016) argued that this money was meant for both and supposed to be used for both mitigation and adaptation projects.

Parties at the 2015 Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris decided that before 2025 a new financial goal would be established with USD 100 billion. This was due to the realization of the expenses involved in climate financing for mitigation and adaptation. Taking this into consideration, there is a need to improve local initiative in sourcing for funds for climate change for mitigation and adaptation strategies rather than solemnly relying on multilateral and bilateral finances which are dependents on the government's willingness to lobby for such funds. The negotiations of the United Nations Framework Convention on Climate Change (UNFCCC) the steps taken to provide financial resources for implementing the processes and frameworks has tedious channel which make it not been possible to translate them systematically into regional and national agricultural programmes and investments in the SADC region (Irish Aid, 2017). In addition, the SADC member states still lack the resources, structures and processes necessary for the appropriate mainstreaming of climate change adaptation in agricultural programs and investments due to institutional lapses in their coordination and seizing opportunities (GIZ, 2016;2019).

UNFCCC (2014) reported that in order to keep the global temperature below 2 degrees Celsius and protect vulnerable communities from the impacts of climate change, the developing countries alone will need between USD 110 and USD 275 billion annually to mitigate and adapt to its effects. Aaron *et al.* (2009) pointed out that for effective adaptation to climate change effects, financing alone may not achieve a desired goal. Hence, there is a need for the effective institution coordination and linkage through which the climate finances should be channeled

into. Therefore, investing in institutions and capacity development is cardinal. Institutions are countries' national structures, mechanisms, and related arrangements to effectively implement climate policy and to administer climate finance for adaptation activities.

UNEP (2011) reported that for effective mitigation and adaptation to climate change effects, countries need to invest in institutions such as, the National Climate Change Commission, Inter-Agency Committee on Climate Change, National Climate Change Adaptation Fund, or National Climate Change Trust Funds. Investing in such institutions means creating the necessary policy, institutional, industry, and financial conditions that can help scale up investments in climate action. Building these strong and effective institutions will also require capacity and knowledge building at local and national levels.

2.4 Institutions Involved in Coordination of Climate Change and Adaptation Strategies

The possibility of adaptation is integrating into existing development efforts with an adequate understanding of local livelihood contexts and strategies instead of planning adaptation programmes (Agrawal, 2012). It is only possible if adaptation is integrated with existing development efforts with a sufficient understanding of local livelihood context and strategies rather than planning adaptation programmes separately; weather-related, appropriate arrangements must consider all levels of government, sectors and societal domains in an approach that manages competing priorities and demand for resources. Institutions are critical for any comprehensive adaptation action that countries are starting to embark on, such as in the context of the national adaptation plan (NAP) process. Hence, improving institutional arrangements at all levels, so as to better manage future challenges posed by climate change within the multidimensional context of modern day socioeconomic and developmental pressures. Furthermore, there is lack of connection between national policies on climate change adaptation and the local institutional coordination on the ground with limited involvement of local institutions. This largely makes the intended activities not to be sustainable as they are not locally tailored.

Annaka and Pieter, (2016) pointed out that transparency and accountability are essential for both short-term adaptation projects and long-term climate resilient development. Annaka and Pieter, (2016) and Mulenga, et al. (2015) further argued that within the institutional arrangement, there

should be clarity roles and responsibilities among governmental agencies concerned and lack of such posed a challenge in the implementation. In order to measure the institutional effectiveness in coordinating climate change adaptation activities, the following measures (or markers for effectiveness) were used in this study, namely; training of local farmers, funding communities, encouraging smart agriculture, promoting conservation farming, mobilizing funds, promoting drought tolerant crops and agro-forestry, building capacity to the zones and cooperatives, knowledge transfer, establishment of local institutions, provision of pesticides, provision of irrigation facility, and technical support. The analyses were conducted using a Chi-square to assess the institutional effectiveness of CCA activities from both farmers' and key informants' points of view. Data collection was done on the ordinal scale of measurement and for each of the measures highlighted, rankings were used in the assessment of the institutional effectiveness in coordinating CCA activities. These were; not sure (1) not effective, (2) moderately effective, (3) Effective (4) and Very effective (5) on a 5-point Likert Scale. It must be noted that, local institutions are responsible for effectively implementing adaptation and mitigating climate change. This can be done if the coordination and legislation are strengthened for CCA activities. In other words, before outside assistance to coping capacity is made available, the analysis of the nature of institutional links and access to different social groups at community level becomes critical (Kasope, 2017). Once the relationship has been understood and clearly established, should some institutions be chosen as intermediaries to channel resources towards better coordination of climate change adaptation activities.

Furthermore, Richard *et al.* (2014) stressed that communities do not always participate in adaptation decisions that can lead to short-sighted, irrelevant activities. For example, governments could decide to design policies that encourage farmers to adopt intelligent climate practices, but finance is not available due to institutional weakness. Simatele *et al.* (2015), state that risks are apparent in agriculture, fisheries and many other components that constitute the livelihoods of rural peoples in developing countries. Therefore, this calls for a good local institutional coordination and leverage of finances for effectiveness as climate change variabilities has not spared a single ministry with agriculture sector being the most hit. Garaw (2019) contended that the 2018/2019 farming season in Zambia, was a disaster as many farmers experienced low crop production and total crop failure in some cases, and many communities without crops to harvest.

Korkmaz and Murat (2019) argued that local authorities have the political right and ability to mobilize essential support of local climate change adaptation activities. The efforts and initiatives at the local level help strengthen climate targets and commitments predefined at the national and international level under certain protocols and treaties as member countries. Hence the bottom-up participatory approach of, “think globally, act locally” have been considered necessary for global climate governance and further, individual leadership and willingness of the experts in the department as political championship can be effective in the adoption of Local Climate Change (LCC) measures and policies. Zahran *et al.* (2008) observed that the climate change policies could be among major factors for adoption of local mitigation and adaptation actions. As a result, adaptation strategies need to be put in place at all levels, from national to local, in order to mitigate the negative effects of climate change. It is important to build on and strengthen existing household and community strategies, as well as the role of livelihood dynamics in local decision making to adapt to daily vulnerability (Richard *et al.*, 2014).

Morgan (2010) argues that a shift in capital and associated activities is inevitable to address daily vulnerability, as livelihood capitals play a key role in adaptation and should be directly linked to local institutions. The choice of strategies for coping with shocks by households is not intrinsic. But it is rather an integral part of a context in which other actors such as extension operate to influence adaptation choices and their financial capacity in times of climate impacts (Tom *et al.*, 2011). This then highlights the need for integrating and contextualizing understanding of adaptation and livelihood changes, in particular with respect to drought tolerant and high-temperature crops for many smallholder farmers who depend entirely on rain-fed crops. McGray and Sokona (2012) reported that the main concerns with climate change governance in most African countries are that institutions that are supposed to play a key role in ensuring societal adaptation are weak or missing. Mubaya (2012) contends that, climate variability remains the most critical and exacerbate livelihood insecurity for those farmers with higher degrees of exposure to these stressors to which local institutions and funds must be beefed up starting from the local level strategies for adoption and coordination of CCA (Bronen, 2011; IPCC, 2012).

In line with the complex challenges posed by climate change, it is imperative that government, through its institutions, pay particular attention to community issues to improve their coping skills. Kevan *et al.* (2012) affirms that, Climate risks in the context of social and economic

aspirations there is need to build a sense of ownership of the climate challenge well beyond the Climate Change and Natural Resources Management Department by collaborating the Ministry of Finance and the Public Service jointly and inviting representatives from across the government, the private sector, and civil society to participate as a means to leverage the local finances and adaptation strategies especially among the most vulnerable communities. Taking into account the increase in extreme weather events that are expected to affect the region of Southern Africa, it is essential to assess how institutional structures and national policy instruments have aided or hindered household and community adaptations. In particular, there is a need to reflect on efforts related to the policies that support the maintenance of local adaptations and help retain the resilience of socio-economic through the strengthening of the local institutions which are at the center of the climate change. (David, 2007; Jordan *et al.*, 2017) noted that dry periods and droughts remain the major meteorological factor with devastating impacts on the livelihoods of most rural people in Africa.

Jordan *et al.* (2017) added that the agricultural sector suffers losses of millions of dollars each year due to droughts caused by various crop pests and diseases, such as the Fall army worms. The economic growth in most developing countries is severely hampered with every disastrous drought and floods. Most people in agriculture sector acknowledge climatic extremes and through the agriculture ministries and other non-governmental organizations (DAPP, CAMCO). Jordan, (2011) argues that the challenge though, is to prevent dry periods from developing into disaster droughts, the vulnerability and the resilience of the agricultural sector and of individual farmers are key factors in drought prevention and their adaptive capacity. Inadequate technical, organizational, and financial capacity to fully implement the adaptation capacities amidst unprecedented climatic challenges that affect the smallholder farmers places the individual smallholder farmers into very compromising situation hence making them perpetual casualties of poverty (Makano, 2011; Umar *et al.*, 2012; Lukasiewicz *et al.*, 2016;).

However, communities are coping with unprecedented impacts of an ever-changing climate and weather patterns have become more erratic and climate related events more extreme (Bours *et al.*, 2013). As a result, there is a growing impetus among development organizations to enhance resilience to climate change and integrate adaptation measures in their food and livelihood security programs. This requires understanding the climate related risks that affect the

communities where they work and identifying effective and context appropriate interventions. This is done by first identifying the local institutions into which local finances can be channeled. For example, NGOs, cooperatives and Ministries. Somda *et al.* (2011) and Bours *et al.*, (2013) observed that while there is numerous climate change adaptation (CCA) strategies, the question still remains unanswered on how the donors and implementing agencies determine how to invest limited resources to achieve the greatest impact. There are opportunities that come with the fact that most existing institutions in African countries are either weak or non-existent. For example, the climate change scourge is likely to expose the inefficiency or unaccountability and viable of particular institutions, hence having new institutions for channeling climate finance, coordinating adaptation and mitigation actions across sectors, and reconciling long term resilience with short-term development priorities. For example, the UNDP and the United States Agency for International Development (USAID) working in collaboration with the Ministry of Finance and the Ministry of Agriculture which over sees the climate change financing for bilateral and multi-lateral in Zambia.

Both at the global and local level, there has been improved understanding of how impacts of climate change affect global and local systems as well how these systems can survive the impacts of climate change (IPCC 2007; 2014). However, there is still little knowledge on the role of institutions as well as institutional arrangements in local level adaptation to impacts of climate change. Local climate change institutional coordination such as local cooperatives, NGOs and Ministries established at district level shape impacts of climatic shocks on communities as the success of adaptation measures usually depend on the nature and functionality of existing formal and informal institutions (Mubaya and Mafongoya, 2017). Institutional arrangements like cooperatives at community level and NGOs are key to adaptation as the latter rarely occurs in an institutional vacuum (Agrawal, 2010). There is a need to understand the degree to which external interventions enhance local adaptation and development of affected communities. Institutions are generally formal rules and arrangements that are dynamic, subject to reshaping, governing behavior in an organizational context and normalizing societal practices (Scoones, 1998; Ruttan, 2006). Agrawal (2010) identified four ways in which external intervention can contribute to climate change adaptation; provision of weather and climate information, technological interventions that help increase productivity which are not necessarily targeted towards climatic change but livelihood challenges in general, financial support to assist with implementation of

these technologies and leadership (or capacity building) efforts that promote collective action for adaptation from the local people at community and district level.

Adger and Vincent (2015) reported that the speed at which climate change impacts are unfolding far exceed the limits of adaptation in many parts of the world especially among rural farmers. The African continent has been highlighted as particularly vulnerable in the future, primarily due to its low adaptive capacity and its sensitivity to many of the projected changes (Callaway, 2016). Additionally, climatic changes are taking place in the context of other developmental stresses, notably poverty, and food insecurity (FAO, 2012), as well as in combination with environmental change, drought and land degradation (Thoemas *et al.*, 2011). It is thus essential to develop and implement effective adaptation measures so that climate related risks and opportunities might support development objectives within local and policy decision-making processes (Adger *et al.*, 2018; IPCC, 2017). Adaptation to be achieved local institutions such as cooperatives, and line ministries at district level coupled with NGOs should respond to multiple pressures and changes that affect people's lives. Identifying the precise drivers of these changes, whether environmentally, climatically, or economically driven, is extremely difficult (Adger *et al.*, 2015). Successful adaptations may be viewed as those actions that decrease vulnerability and increase resilience overall, in response to a range of immediate needs, risks and aspirations (Van-Aalst *et al.*, 2018).

Therefore, in order to address the effects of climate change, local climate change adaptation should be well linked to institutions of which local institutions should have the capacity to leverage from the diverse opportunities in accessing climate finance. For example, reduce on the bureaucracy channel of funding climate change projects for adaptation such as having local institutions directly linked to the Nationally Designated Authorities, and have the local people well vested in the information, diversification (drought tolerant crops such as cassava), technologies, and much more knowledge incorporation for adaptation (IPCC, 2017). The local institutions should endeavor to mobilize resources locally, through government and civil society organizations before the outside donors as much as it's a known fact that the developing countries have low financial capacity for adaption and mitigation.

There are only policies not laws in the legislation on the coordination of climate change adaptation which does not give ultimate power to these institutions to play their roles. Be it at

local level, the coordination of climate change activities is a not adequate due to their absence or lack of human resource. Hence the lapses of the legislation make the institutions to be ineffective. There is need to reduce the top-down planning and vertical coordination and embrace the bottom up way of planning and implementing of climate change activities with a horizontal coordination in planning where. For example, the adaptation of smallholder farmers to plan and have resources to procure chemicals and pesticides unlike waiting for the delivery from the national office. Local public institutions councils and central government departments and private actors are involved in the planning and implementation of the development issues to adapt to climate change. Some scholars have observed that the existence of legal mechanisms at the national or international level could have an impact on the adoption and maintaining of the climate activities by local governments (Bedsworth and Hanak, 2013; Reckien *et al.*, 2018). The bearing of certain interest groups in the club could bear a substantial impact on the acquisition of Local Climate Change initiatives by local authorities (Sharp *et al.*, 2010).

Local initiatives and efforts related to climate change enhance domestic and international actions on causes and impacts of climate change. Local institutions play an important role in climate change policies and strategies as a stakeholder and as a governing body. Corbera, *et al.*, (2006 and Paul *et al.*, (2008) suggest that the local institutional, government lacks in terms of capacity and existing regulations in the development and implementation of climate change strategies in Turkey are numerous with lack of financial and institutional capacities to handle Local Climate Change initiatives for adaptation. Lumosi (2014) the challenge of power dynamics like change of regimes has many institutions not to coordinate well, having an overridden mandate of operation, thereby undoing what others have done as a result the communities are made more vulnerable to the effects of climate change variabilities. In addition, adaptive capacity at the local level might be constrained by factors such as weak institutions, inadequate infrastructure and poor access to markets. These constraints may make implementation of the proposed adaptation strategy difficult or even impractical (World Bank, 2010).

2.5 Climate Change Adaptation Coordination Internationally and in Africa

The impacts of climate change effects, subjects related to linking local climate change institutional coordination and adaptation have been carried out by different researchers. For example, Hangbae (2016) reported that in 2014, Jamaica experienced one of the worst droughts

in the past 40 years. Drought was associated with El Nino's 2014/2015 drought. Thus, the institution had coordinated by providing both long and short term adaptation measures such as; making community dams, community cooperatives to channel resources for unseen climate variabilities. Losses in agriculture and farmers' livelihoods have been reported as significant. Swanepoel (2018) study done in the United States of America noted that institutions coordinating climate change finance in Jamaica are decentralized at the local level and that local institutions feed into national institutions through the stakeholder-driven climate policy process. Tribbia *et al.*,2008; Rasmus and Daniel,2011; Hangbae, 2016) reported that most international development agencies active in Jamaica were invited and participated by integrating their efforts in the already existing country's institutions through which the finances were channeled. Jamaica's progress to adapt offers a useful lesson for how high-level planning, such as National Adaptation Plan processes and Nationally Determined Contributions can trigger actions that provide real benefits to vulnerable actors critical to maintaining key components of a country's economy.

Willie (2013) A review of the Strategic Framework for Strengthening the Institutional Capacity of the Philippines to Adapt to Climate Change was a joint programme involving eight United Nations agencies and the Ministry responsible for the Philippines. The joining of different institutions towards climate change adaptation enhances the communities to adapt to climate variabilities. Nest (2011) the funding aimed at enhancing the various institutions' ability to handle the effects of Climate Change with the scope of having both horizontal local people and vertical government hierarchy in coordination of adaptation activities. The first effect of the task was to inject climate risk strategies into the national and other local development programs and operations. The second output of the project was to strengthen national and local capacities for implementing responses to climate change adaptation activities (Smita, 2013).

Brennan and Vogel (2015) adaptation governance is a limited social process conducted across governmental structures and institutions (Adger *et al.*, 2009; Bauer and Scholza, 2010), including at the national, provincial, urban and local levels, for space governance (Dickinson and Burton 2011). In addition, the study by Bahadur, and Bhandari, (2008) in Nepal stated that the construction of dams and other infrastructure goes hand-in-hand with awareness, institutional development and income diversification for larger smallholder farmers.

Other similar studies have been conducted on the “hotspot of climate change in Ethiopia” which has experienced extreme climate variability with negative impacts on agricultural and pastoral livelihoods (Brown *et al.*, 2012; Conway and Schipper 2010; Golrokhian *et al.*, 2016). The studies focused on climate risk projections, such as warmer temperatures, increased incidence of erratic drought and unpredictable precipitation. However, Golrokhian *et al.*, (2016) focused on the Graduation with Resilience to Achieve Sustainable Development (GRAD) project., to improve livelihoods for chronically food insecure households in Ethiopia's rural uplands. The project aimed at improving community and household resilience to climate change and increase family incomes through market linkages particularly livestock value chains. Golrokhian *et al.* (2016) found that the institutions in Ethiopia devices, tools using a multi-level approach intended to engage stakeholders in the community and regional stages, and facilitate a process of coordinating climate change finances in relation to Agra-ecological and livelihood diversity.

Further Adidah *et al.* (2017) in an effort for smallholder farmers to improve their agricultural output, farmers in Rakai District (Uganda) have begun to diversify crops and adopt improved varieties of corn, manioc, beans and potatoes in an endeavor to overcome drought and pest or disease outbreaks exacerbated by high temperatures. The results also demonstrate that the local institutions of the Rakai district, at district level, do not participate sufficiently in policy-making processes at the national level and do not possess sufficient skills to enable long-term planning for climate change adaptation and mitigation. Inadequate technical capacity coupled with poor integration of research evidence leads to poor policy planning and inefficient policies.

Other studies relating to climate change adaptation were conducted in, Zimbabwe and Tanzania (Agrawal, 2008; Agrawal *et al.*, 2009; and UNFCCC, 2016). These studies focused on the various functions exercised by local institutions in terms of information exchange, coordination, planning, resource mobilization, leadership, improvement of agricultural production and allocation of all targeted inputs on climate-smart livelihoods and adapting to climate change. The studies concluded that institutions took on a central part in ensuring effective adaptation to climate change impacts among the community members.

To some extent, it's happening in other parts of Zambia, but not in the Mkushi District. Therefore, to measure the effectiveness of institutions in coordinating climate change adaptation, the study used five measures of effectiveness of CCA activities with regard to legislation: Do

institutions have binding laws or policies on coordination of climate change adaptation activities; If the institutions have the binding laws what is the explanation for why they have them; What inadequacies exist in the law for coordinating climate change activities and the levels at which they exist, and what should be done to enhance the laws in coordinating climate change adaptation activities

2.6 Chapter Summary

Climate change has presented diverse challenges, especially in the agricultural sector due to its sensitivity. Annually, climate change impacts such as prolonged droughts, extreme temperatures and low rainfall lead to lower agricultural production globally. In addition, climate change impacts adversely affect all the dependable agricultural livelihoods. It is for this reason that there should be enhanced and sustained funding to mitigation and adaptation strategies especially to rural smallholder farmers. In this regard, resources should be mobilized both locally and internationally through bilateral and multilateral avenues. For effective adaptation strategies among smallholder farmers, there is a need to have effective and strong institutions supported by the legislature for coordinating climate change activities and channeling the required technical and financial support. The studies cited have indicated that strong and effective institutions play a central part in supporting adaptation strategies to climate change impacts among farming communities.

CHAPTER THREE: STUDY AREA

3.0 Introduction

This chapter describes the physical, climatic and socio demographics of the study. This chapter is divided into five sections; section one describes the location of Mkushi District in Central Province of Zambia, section two explains the climatic conditions of the study area, section three deals with the Drainage and Hydrology of Mkushi District, section four describes the demographic and population characteristics of the study area and section five accounts for the economic activities of the people in the study area.

3.1 Location and Administration

The study area was Mkushi District located in the Central Province of Zambia and covers an area of about 17,726 km² (Manwasha, 2012). Mkushi District is approximately 319 km from Zambia's Capital city, Lusaka. The Great North Road runs through Mkushi District, connecting Kapiri Mposhi on the South-West border and Serenje on the North-East border. The District also shares borders with Chongwe, Nyimba, and Masaiti Districts as well as the Democratic Republic of Congo. Administratively, Mkushi District is divided into 14 wards. It lies on the latitude 8440000 North 76000 East and Longitude 8520000 South 760000 East (refer to the map).

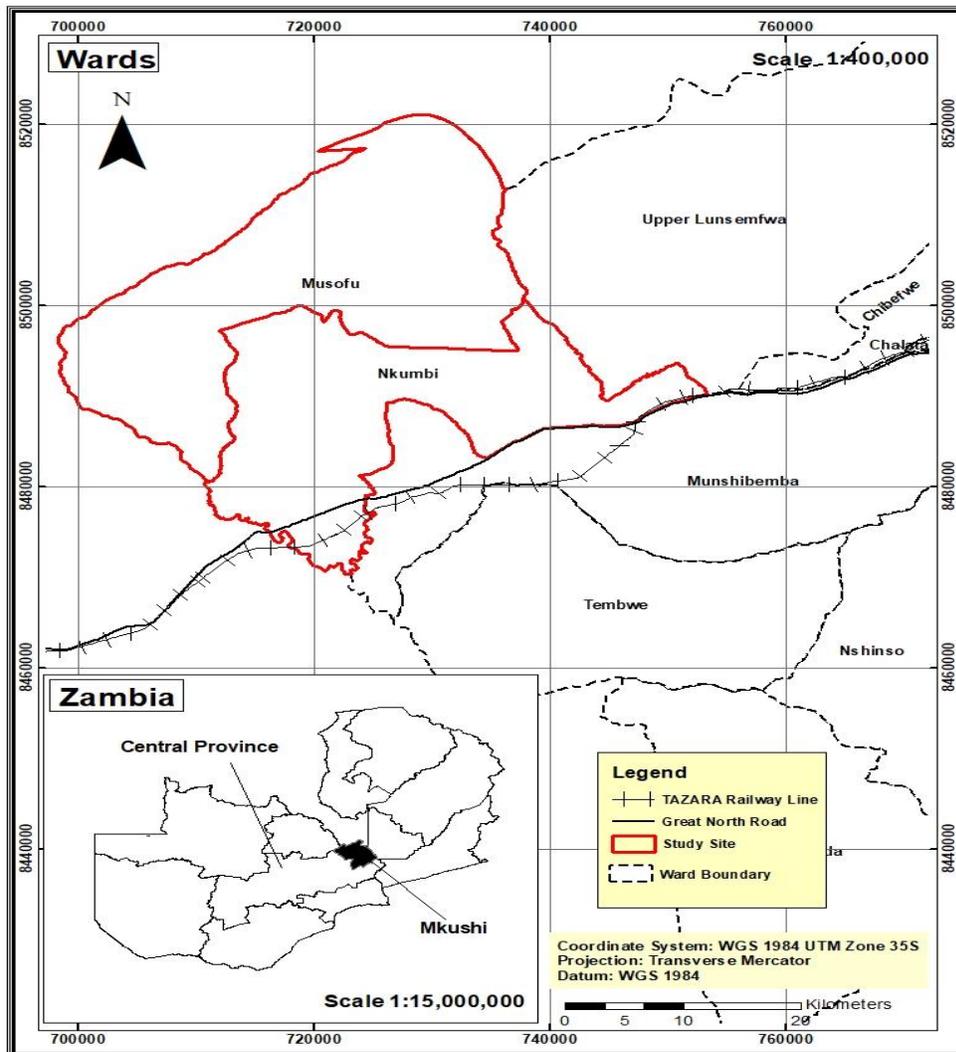


Figure 3.1 study area (Nkumbi and Musofu)

Source: Author (2020)

Mkushi is administered by the Central government and Local Authority (Council) Mkushi District Council. Administratively, local government structures start from ward level. The local government is the overseer of all development activities, controls and maintains the environment for sustainable development. There are 14 wards and each ward has a representative who sits in the full council meeting, which the decision is making organ, where community interests are represented Ministry of local government and Housing (MLGH, 2009). Technical staff in various departments represents the council on a range of matters including natural resources, tax and revenue. Two sets of policies govern the local government, the national and locally adopted

policies. In cases where the local-by-laws are in conflict with national level policies, the latter superseded (Koch, and Patel, 2007).

3.2 Climate and Drainage

Mkushi experiences a subtropical type of climate despite it being in the tropics. It is representative of conditions found in semi-arid parts of Zambia. The climate is seasonal consisting of a cool and dry season from May to August, a hot and dry season from September to October and a warm and wet season from November to April. Mkushi lies at 11001m to 1300m altitude (Simatele, 2010). In December, January and February, rainfall in Zambia usually exceeds potential evapotranspiration of crops (GRZ, 2007). July is the driest month while December/January are the wettest months. The mean annual temperature for Mkushi is 19.3°C with daily temperature ranging from 14.6°C in July to 33.1°C in October. The mean daily maximum temperatures in Mkushi is 20 C (range: 10°C in June to 33.1°C in October) and the mean daily minimum temperature is 10.9°C (range: 13°C in July to 23°C in December), with an average of 24°C (Alkay *et al* , 2015).

Two rivers and one stream traverse Mkushi District, namely; Lunsemfwa and Mkushi Rivers, as well as the Chibefwe stream. Lunsemfwa River is found in the western side, while Mkushi River is found in the eastern part of the district, and the Chibefwe stream found in the central part of the district (CSO, 2016)

3.3 Demography and Population

According to the 2011 to 2035 population and housing projection for 2020, the district had an estimated population of 226,419 people of which 113,803 are male and 112,616 are female, with 85.1 percent of the population living in rural areas (CSO, 2012). Mkushi District has a population growth rate of 3.7 percent persons per square kilometer and annual population growth of 3.4 percent for 2011-2020 which is the highest in the Province. The annual population projection for Mkushi is 3.4 percent while for Lusaka is 3.8 percent and Livingstone is at 2.8 percent. This in turn tells us that the population for Mkushi is growing at very fast rate compared to Livingstone. Therefore, Musofu has a total population of 4,237 people and Nkumbi has 12,045 people (CSO, 2015) and because of this difference in population size, it made the study achieve the objective as it gave the insight on how institutions operate towards climate change adaptation

activities in the area. Musofu is located on the west part of Mkushi with a mixed socio-economic activity such as mining, farming and schools' infrastructures. While Nkumbi is a mixed farming area with commercial and smallholder farmers, schools and clinic infrastructures located in the West North of Mkushi.

3.4 Economic Activities

Mkushi is known for its large commercial agricultural operations and boast a substantial population of expatriate farmers which offer direct employment to the locals (CSO and Nuela 2015). One major determinant of the social status and economic power of people is their occupation. Majority of the people in Mkushi District are farmers with (*Zea mays*) maize, (*Manihot esculenta*) cassava and (*Lopmea batatas*) sweet potatoes being the most cultivated crops by smallholder farmers. Other common livelihoods include poultry farming, rearing of goats, and cattle, while (*Triticum aestivum*) wheat, (*Nicoiana tabacum*) tobacco (*Glycinee max*) soya beans are also grown by both commercial farmers and smallholder farmers. Those engaged in petty trade resort to small-scale farming during the rainy season and only use petty trading as an off-farm livelihood (CSO; 2009). Traditional crafts include clay pots, reed mats, and baskets and are made by the local people as a means of income during the off-season, although increased access to manufactured goods has reduced production in recent decades. Mkushi District is rich in minerals such as: manganese, gem, and gem deposits spurring a new mining development in the area, including the Fishtie copper project at Kashime. However, the main stay of the majority is smallholder agriculture (MOAC, 2012).

CHAPTER FOUR: METHODOLOGY

4.0 Introduction

The research methodology is a systematic means of answering a research question. It is a process through which researchers proceed with their work of explaining, predicting and describing events (Kumar, 2005; and Rajasekar *et al.*, 2006). This chapter provides an overview of the methodology used in this study. The research design description of sampling techniques, methods of data collection and analysis, validity and reliability of the research and the ethical considerations of the field. The chapter starts with the overview of research approach and research philosophy. It also provides a justification of the chosen approaches, target population, sampling technique, sample size, data collection methodology, validity and reliability, ethical issues and data analysis.

4.1 Epistemological and Ontological Considerations:

Epistemology is a concern about what is or should be considered acceptable knowledge in an academic discipline. It responds to the question of whether the social world can and must be studied according to the same principles, procedures and ethics as the natural sciences. The view that affirms the importance of imitating the natural sciences is always linked with an epistemological position known as positivism (Bryman, 2012; Creswell, 2014). Ontology is concerned with the nature of social entities as the consistency of knowledge perceived in reality. The question is whether the social entities can and should be considered objective entities with a reality external to the social actors, or whether they can and should be viewed as social constructs built on the perceptions and actions of social actors. The epistemological position that confirms it is constructionism that asserts that social phenomena and their meanings are continually being accomplished by social actors (Bryman, 2004; Norman 2011). It implies that social phenomena and groups are not only produced by social interaction, but that they are in a constant state of revision. Positivism is an epistemic position that advocates the application of the methods of the natural scientific disciplines to the field of societal reality and beyond (Bryman 2012; 2008). Knowledge is obtained by gathering facts on which the laws are based (Bernard, 2006; Bryman 2012) The field of social reality should follow similar methods as employed by natural scientists such as experiments and survey in the subject area of social reality. This approach believes in the objective nature of social facts that should be considered

and introduced in an objective manner independent of subjective intuition and introspection. On the other hand, the interpretive epistemology recognizes the “speciality of social reality as against that of the natural order” (Creswell, 2012). The Interpretivism recommends that the subject area of social reality requires that the scientists understand the subjective interpretation and meaning that individual social actors attach to social reality and advocates that the researcher empathize (Bryman, 2008; Oliver, 2010). It is because there is the belief that people within any social setting make sense outside of their social world and thus act, feel and think about how they understand. The researcher should therefore develop an understanding of how people think, feel and act and the meanings they attach to their actions.

Nevertheless, the ontological approach questions whether the entities of the society can and should be considered objective entities that experience a reality external to social actors or whether they are the outcome of social structures built from the perceptions and activities of social actors (Bryman, 2012; Bergan, 2008). There are also two main assumptions of objectivism and constructionism. The objectivist approach asserts that the social reality and its meaning that the researcher intends to study are external to the social actors and independent of them. Furthermore, constructionist ontology affirms the continuity of social reality and its meaning being built by the social actors themselves (Creswell, 2014; Johnson *et al.*, 2001). Indeed, people make sense and the meaning of social phenomena and the researcher is responsible for understanding these meanings that actors build. The constructionist approach also acknowledges the active nature of imports that people construct and as a consequence there are fluctuations in how people make meaning at any spot and any stage in time. The study used both an Interpretivism and constructivism to study the local institutions in coordinating CCA in Mkushi. Denzin and Lincoln (2002) contend that the quantitative approach involves testing of the hypothesis, therefore the data collected from both key informants and respondents was interpreted using a Chi-square to see the associations on the effectiveness of climate change adaptation coordination using the numbers responded gave on the Likert scale for the effectiveness of institutions. On the qualitative component the data collected from the responded was constructed into themes and descriptions to further understand different human experiences through voices, meanings and events. Hence the researcher used constructivism. The study applied these underpinnings by asking questions to get the ideas which the people have or built around climate change and the roles institutions play, the numbers allocated to the effectiveness

of institutions by the responded where corded, interpreted for testing of the hypothesis and while the ideas where grouped into themes. This allowed the researcher to gain a better understanding of the study of perceptions, opinions and beliefs about the social reality of individuals using the philosophical foundations described above and, as a result, it influenced the research design.

4.2 Research Approach

The research approach is a design and procedure consisting of general assumption steps leading to a detailed method of data collection, analysis and interpretation (Chetty, 2016). In particular, there are two types of research approaches: qualitative and quantitative (Kothari, 2004). The study used a mixed approach in which a qualitative and quantitative approach was combined. Qualitative research uses descriptive measures for the assessment of attitudes, opinions, behaviour and requires an inductive approach to analysis. Unlike quantitative research, which uses figures to evaluate the performance of the phenomenon and uses a deductive approach to data analysis (Allison and Joanna, 2017). This study used a parallel mixed design where the data was integrated during the interpretation phase after the quantitative and qualitative data were analyzed. Therefore, both qualitative and quantitative approaches were used in allowing the researcher to explore various perspectives and uncover relationships that are between the intricate layers of the multifaceted research questions and the findings complemented each other by using both language and numbers. The nature of the study required input from people on local institutional co-ordination for climate change adaptation and adaptation strategies, which requires a qualitative approach and to assess the effectiveness of institutions on climate change adaptation. Therefore, qualitative research puts the emphasis on understanding by carefully examining people's words, actions and records and the meanings attached to them and this was by content, theme analysis. On the other hand, quantitative research investigates such words, activities and records at a mathematically significant level on which the Likert scales was used, thus, measuring the effects of observation (Halcomb and Hickman, 2015). The qualitative information for this work was generated through the administration of semi - structured questionnaires with open ended questions and reflections.

4.3 Research design

Research design involves creating conditions for data collection and analysis so that the relevance of the research is combined through a well-established procedure (Creswell and Clark,

2011). Taylor (2000) defines research design as plans and strategies for identifying and responding to research questions.

Cross-sectional design involves finding relationships between variables at one moment in time and is closely connected with questionnaires and structured interviews but also involves unstructured and semi-structured interview in some cases (Williams, 2007; Yin, 2003). This study employed a cross section to explore the strengths and or weaknesses in coordination arrangements for climate change adaptation at a national level (using key informants from institutions) and how this impacts on local level adaptation in Mkushi District with Musofu and Nkumbi as study sites. Cross-sectional design also used for small mixed resident (144) and commercial farmers to learn how local institutional climate change coordination supports climate change adaptation with the aim of strengthening national climate change coordination.

4.4 Sampling

Sampling is the process by which a sample is selected for the purposes of collecting data. A sampling design is a defined design, determined before data collection, that results in a sample of a given population (Andrew and Halcomb 2010; Simons and Lathlean, 2010). This work used a purposive and simple random sampling. This was because the key informants were purposefully sampled and the respondents (smallholder farmers) were randomly sampled in order to have equal prospects of the respondents in each site be interviewed. A stratified random sampling was done on the smallholder farmers. The first thing was to identify the two sites (Musofu and Nkumbi) which were purposively sampled from the fourteen wards in Mkushi. The two strata were chosen because they have the same agricultural characteristics and are parallel to one another. The strata had each four zones from which 18 smallholder farmers were picked randomly using the farmer register and this gave 72 respondents in each study site. The zones from the sites became the strata and a total of 8 zones gave 18 respondents each which came to 72 for each study site. From the two strata, had 72 respondents each, which added up to 144 plus 16 key informants to get 160 respondents for the study of the sample population of 272. Purposive sampling was used to select key informants. This is a non-probability sampling technique that is used to sample selected members based on their knowledge, connections and expertise on the research topic (Freedman *et al.*, 2007). As part of this research, key informants

were selected based on their expertise in coordinating efforts to adapt to climate change. The key informants have experience with institutions that coordinate such activities.

4.4.1 Sample Size

The study used purposive sampling to select two sites within Mkushi District, namely; Musofu and Nkumbi, with 72 respondents from each site from the total of 128 from each site. These two sites have been selected because of their mixed composition of activities including commercial and small-scale agriculture. A total sample of 144) respondents was randomly chosen from the zones using the village register which gave (74 males and 70 females) in total. The sample size was 160 with a total population of 272 which was determined through an apriori analysis using G-power 3.2 (Erdfelder *et al.*, 1996). The selected sample size provided a statistical strength of 0.98 to detect a moderate two-tailed effect size with a significance level of 0.05. The G-Power statistical package for determining sample sizes was selected because of its ease of use and the wide range of study designs to which it applies (Cunningham, 2007). The researcher also used a Qualtrics base sample size calculator that used the 95% confidence level of the population size of 272 for farmers, a margin error of 5%, giving the ideal sample size of 160. The study included 16 key informants purposively sampled from; The Climate Change and Natural Resources Management Department (CCNRMD), The Ministry of Environmental and Natural Resources (MOENR), Ministry of Planning and National Development (MPND), Ministry of Finance (MOF), Ministry of Local Government and Housing (MLGH), Ministry of Agriculture and Livestock (MAL), Zambia National Farmers Union (ZNFU) and traditional authorities, Disaster Management and Mitigation Unit (DMMU), Central Province Disaster Management and Mitigation Unit Coordinator (CPDMMU), Provincial Agriculture Coordinating Officer (PACO), District Agriculture Coordinator Officer (DACO), Mkushi District Council officials (MKDC). These key informants were sampled as enshrined in the climate change policy they are responsible for climate change adaptation and mitigation activities.

4.5 Data Collection

The study used both primary and secondary data. Primary data was obtained from the field through structured interviews using a questionnaire. The questionnaire was used with specifically constructed questions and asked in the same words through all the respondents, key informant interview guides and observations with respondents. Data on institutional coordination on

adaptation activities under this study was collected using structured interview questionnaire smallholder farmers and key-informant as the questions were asked with an opportunity to probe for details during question administration so as to get more detailed information on the phenomena. The same tools were also used to collect data on the loopholes in legislature and ranking of the institutions effectiveness and how local institutions can be more proactive in climate change adaptation as they feed into the national climate change adaptation strategies and foster decision making and policy formulation through local institutions. Observations were used to ground truth the local institutional coordination challenges presented by respondents. Secondary data was collected through the review of literature. That is, Journals, Books and the internet. Secondary data included gathering information about existing institutions working on climate change adaptation, and adaptive strategies that the vulnerable communities can implement for a long term unlike short term hence this formed the basis of this study.

4.5.1 Questionnaire

Personal interviews require the interviewer asking questions generally in a face-to-face contact to the other person (Zikmundu, 1988; Vandyke and Christine, 1998; Cohen *et al.*, 2007). For this study in generating quantitative data a questionnaire (structured interview guide) was used. This was done through asking the respondents how they respond to climate change variabilities such as droughts, pests, floods and high temperatures. Effectiveness of institutions in coordinating climate change adaptation activities was done by the use of Likert scale ranking from 1-5 using five indicators; (Very effective [5], Effective [4], Moderately effective [3], Not effective [2], Not sure [1]). This was administered to both key informants and smallholder farmers and the responses were recorded. The respondents (key informants) some were asked in English while recording their responses while (smallholder farmers) some had challenges with English so the researcher used the language the respondents were conversant with by interpreting into Bemba, Lala, Swaka and Nyanja while recording the responses in English. This was necessitated by the fact that the study sites major languages used the researcher was so conversant with.

4.5.2 Semi –Structured Interview Guide

A semi-structured interview was used to collect data from the smallholder farmers. Semi-structured interview is a hybrid, moderate and combination of the structured and unstructured

interview, which means that some questions are predetermined, and are open ended while others arise spontaneously in a free-flowing conversation (Crouch *et al.*, 2003. Kothari, 2004; Martic, 2018). This research used interview guide and a questionnaire to generate qualitative data and to get the information from respondents on climate change adaptation, roles played by the institutions in coordinating climate change adaptation activities. This was to produce a thick detailed description of participants' feelings, opinions, and experiences; and interpret the meanings of their actions (Deville, 2008). This method of data collection allowed a researcher to have the in-depth on the study from the respondents as it allowed for clarification and elaboration of the answers given (May, 2001). The interviewer probed the respondents depending on their answers and by doing so this provided more information about the context in understanding the respondents' answers and efforts were made to ask questions in the same way to all respondents in order not to have distorted responses.

4.5.3 Observation

Observation method is the method of data collection where the information is sought by way of the researchers own direct observation without asking from respondents. This method is commonly used in studies relating to behavioral sciences (Kothari 2004; Bryman, 2008). Therefore, the researcher used a non-participatory observation where he observed by making himself less a member of the group he was observing throughout the field, while taking photographs and notes. This method complemented information from other data collection methods, and also validated the information gathered by other data collection methods that was employed in the field. It was observed that many smallholder farmers had low capacity to adapt, labour to cultivate and manage the effects of fall army worms in their fields. There are no NGOs and civil society organizations fostering CCA in the district only the camp officers from the ministry of agriculture who are heavily constrained by funding to facilitate their operations.

4.6 Data analysis

Data analysis is a process of inspecting, cleaning, transforming, and modeling collected information with the goal of discovering useful information, suggesting conclusions, and supporting decision making (Adèr and Mellenbergh, 2008). The research used both quantitative qualitative analysis. The quantitative data was analysed using the Chi-square test to assess the responses from the two sample groups namely; key informants and the smallholder farmers'

respondents on their perceptions on institutional effectiveness towards institutional effectiveness on coordinating CCA using the variables : Training of farmers, funding communities affected by climate change impacts, Promote Horticulture and Drought Resistant Crops, Promote Conservation Farming, Encourage Climate Smart Agriculture and Crop Diversification and Mobilizing Funds for Communities Affected by Climate Change Effects. A Likert Scale of 1 to 5 was employed to collect data from respondents which was used to run the Chi-square test to test the hypothesized on the effectiveness of the institutions towards CCA activities in Mkushi. Qualitative data collected was run into the SPSS which included data on socio-economic characteristics for example; age, marital status, employment status, level of education of respondents and their perceptions/opinions on the key institutions steering climate change adaptation. This gave an output in percentages which were written in table forms. Their roles and the legislation on their coordination and effectiveness of adaptation strategies to climate change effects. The analysis also involved grouping of responses that fell in similar categories or themes. According to Moore and McCabe (2005), this type of research is where data gathered is categorized in themes and sub-themes for compatibility. The main advantage of thematic analysis is that it helps in data collected being reduced and simplified to specific themes or topics, while at the same time producing results that may then be measured using quantitative techniques (Shampoo and Resnik, 2003). The statistical operations were conducted in SPSS 23 and Microsoft Excel 2016 for the quantitative data using a Chi-square at probability level, $P = 0.05$.

4.7 Validity

Kothari (2004) refers validity to the extent to which a test measures what we actually wish to measure. Two forms of validity include internal and external validity. External validity of research findings is their generalization to population, settings, treatment variables and measurement variables. The external validity might also refer to the enhancement or extension of the study results to wider context over the existing research environment (Remenyi, 1998). To ensure external validity, simple random sampling was used in the selection of respondents from the smallholder farmers register where all had an equal chance of being selected and the results were generalized to the population of Mkushi where the study was conducted.

Kothari (2004) argues that internal validity of a research design is its ability to measure what it aims to measure. Internal validity entails that the results of the study cannot be generalized to other contexts or localities. In this study, validity for the quantitative data was ensured by meeting the assumptions for the use of the Chi-square. For the qualitative data, validity was ensured by asking the respondents questions in the same way for all consistently. In addition, the researcher did not ask suggestive questions that led to the answer and that consent was sought prior to the interview. By so doing, both external and internal validity of this study were assured.

4.9 Reliability

Saunders *et al.* (2009:29) defines reliability as "the extent to which analysis procedures or data collection techniques would yield consistent findings". Saunders *et al.* (2009) further contended that reliability refers to the measure that offers the same results on each repeated test or experiment. Collis and Hussey (2009) argued reliability ensures credibility of the research findings. Therefore, in order to ensure reliability in this study, recorded data was checked and filtered and later tested using two tailed T test. By so doing, a high level of reliability and validity was maintained. In addition, the pre-test data collection was conducted with specialized people to check if consistent answers were coming out from the interviews.

4.10 Ethical Considerations

Before undertaking this study, consent was sought from all participants who were to take part in this study. The ethical clearance was obtained through the ethical clearance committee and an introductory letter was obtained from the Head of Geography and Environmental Studies Department in the School of Natural Sciences at the University of Zambia (UNZA). All personal and organizational details of participants were kept anonymous in this study, and these details were not used for any other purpose apart from research and academic purposes. In addition, every participant was assured anonymity and only willing respondents were included for study and their details were treated with complete confidentiality. Participants were fully informed regarding the objective of the study, while they were assured that their answers would be kept confidential and solely used only for academic purposes. Further, participants were not harmed in anyway or abused both physically and psychologically during the process of the research.

CHAPTER FIVE: PRESENTATION OF RESULTS

5.0 Introduction

This chapter presents results of the research study and is organized into six sections using themes related to each research objective. The sections include; socio-economic and demographics characteristics of respondents, and key informants’ effects of climate change in Mkushi and Climate Change Adaptation (CCA), role of institutions in coordinating CCA activities in Mkushi, Legislation on the coordination of climate change activities in Mkushi, Institutional effectiveness in coordinating climate change adaptation activities and challenges faced by institutions and recommendations by the respondents.

5.1 Socio-Economics and Demographics Characteristics of Respondents

5.1.1 Farmers’ Demographics

5.1.2 Distribution of Respondents by Age and Gender

The results in Table 5.1 show the age groups of the farmers that were interviewed by gender. Majority of farmers were in the age category of 31-40 years (31.3 percent), seconded by 51-60 (18.8%). The age category with the least proportion of respondents was 20-30 (15.3 percent). Of the total interviewed, 74 (51.4percent) were male while 70 (48.6 percent) were female. For both genders, the age category of 31-40 was the most frequent. On the other hand, while the second most frequent age category for males was that of 51-60, that for females was seconded by 40-50.

Table 5.1: Distribution of Respondents by Age and Gender

Age Group of Respondents	Gender of respondent				Total	
	Male		Female			
	Frequency	%	Frequency	%	Frequency	%
20-30 years	10	13.5	12	17.1	22	15.3
31-40 years	27	36.5	18	25.7	45	31.3
41-50 years	7	9.5	17	24.3	24	16.7
51-60 years	16	21.6	11	15.7	27	18.8
61 and above years	14	18.9	12	17.1	26	18.1
Total	74	100.0	70	100.0	144	100.0

Source: Field Data 2020

5.1.3 Distribution of Respondents by Level of Education by Gender

The highest level of education attained by the majority of farmer respondents was primary (50.7 percent), seconded by upper basic (18.8 percent) (Table 5.2). The education attainment level category with the least proportion of respondents was tertiary (2.1 percent). For both genders, primary was the most frequent education level attained (50 percent males; 51.4 percent females). While the second most frequent education attainment level for males was that of secondary, that for females was seconded by upper basic.

Table 5.2: Distribution of Respondents by Level of Education by Gender

Level of education	Gender of Respondent				Total	
	Male		Female			
	Count	%	Count	%	Count	%
None	6	8.1	16	22.9	22	15.3
Primary (1-7)	37	50.0	36	51.4	73	50.69
Upper Basic (8-9)	12	16.2	12	17.1	24	16.7
Secondary (10-12)	17	23.0	5	7.1	22	15.3
Tertiary	2	2.7	1	1.4	3	2.1
Total	74	100.0	70	100.0	144	100.0

Source: Field Data 2020

5.1.4 Distribution of Respondents by Occupation and Gender

The majority of the respondents were smallholder farmers (98.6 percent) and the rest (1.4 percent) indicated business as their main occupation (Table 5.3). All the female respondents' main occupation was farming while 2.9 percent of the males indicated business as their main occupation.

Table 5.3: Distribution of Respondents by Occupation and Gender

Occupation	Gender of Respondent				Total	
	Male		Female			
	Count	%	Count	%	Count	%
Farmer	74	100.0	68	97.1	142	98.6
Business	0	-	2	2.9	2	1.4
Total	74	100.0	70	100.0	144	100.0

Source: Field Data 2020

5.1.5 Distribution of Respondents by Income and Gender

At least 45.1 percent of smallholder farmer respondents were in the cash income bracket of ZMW100-300 per month, seconded by ZMW301-K600 (27.1 percent) (Refer to Table 5.4.).

Table 5.4: Distribution of Respondents by Income and Gender

Monthly Income (ZMW)	Gender of Respondent				Total	
	Male		Female		Frequency	%
	Frequency	%	Frequency	%		
100-300	30	40.6	35	50.0	65	45.1
301-600	18	24.3	21	30.0	39	27.1
601-900	6	8.1	3	4.3	9	6.3
901-1200	8	10.8	7	10.0	15	10.4
1201-1300	1	1.4	1	1.4	2	1.4
1301-1500	10	13.5	1	1.4	11	7.6
Not sure	1	1.4	2	2.9	3	2.1
Total	74	100.0	70	100.0	144	100.0

Source: Field Data 2020

(1USD = ZMW15; June 2020)

5.1.6 Distribution of Respondents by Years of Residence and Gender

The sample included respondents who had stayed in the study area for 11-20 years (26.4 percent), or 31-40 years (22.2 percent). All the male respondents' most reported period of stay was 31-40 years (27 percent) while that for females was 11-20 years (27.1 (Refer to Table 5.5).

Table 5.5: Distribution of Respondents by Years of Residence and Gender

Years of Residence in Mkushi	Gender of Respondent				Total	
	Male		Female		Frequency	%
	Frequency	%	Frequency	%		
1-10 Years	9	12.2	14	20.0	23	16.0
11-20 Years	19	25.7	19	27.1	38	26.4
21-30 Years	12	16.2	13	18.6	25	17.4
31-40 Years	20	27.0	12	17.1	32	22.2
41 Years and above	14	18.9	12	17.1	26	18.1
Total	74	100.0	70	100.0	144	100.0

Source: Field Data 2020

5.1.7 Key Informants' Demographics

This research involved 16 key informants in total segregated as 10 males and 6 females drawn from various institutions engaged in climate change and climate change adaptation activities.

5.2 Loopholes in the Legislation on the Coordination of Climate Change Activities in Mkushi District

In order to understand the loopholes in legislation and what could be done to avert them, five measures of effectiveness of CCA activities with regards to legislation were used in this study. Do institutions have binding laws or policies on coordination of climate change adaptation activities. If the institutions have the binding laws what is the explanation for what they were; What inadequacies exist in the law for coordinating climate change activities and the levels at which they exist, and what should be done to enhance the laws in coordinating climate change adaptation activities. These are illustrated in Figure 5.4. With regard to whether binding laws exists, 62.5 percent of the respondents believe that the institutions involved in CCA have binding laws. On the other hand, 37.5 percent of the key informants indicated that the institutions do not have binding laws (Figure 5.4A).

The respondents were further asked to indicate why they thought the laws on CCA and the most common response was that the laws were directly linked to the provincial administration with 43.8 percent representation (Figure 5.4B). Most of the respondents, 56.3 percent felt that the legislation is sufficient and there were no inadequacies. However, 18.8 percent of respondents indicated that the Policies and Acts are there but not adequately enforced. This implied that they are mostly broad and are not narrowed down to the specific areas and addressing specific issues on CCA. While 12.5 percent showed that the law is inadequate this implied that the existing law do not address most pertinent issues in CCA (Refer to Figure 5.4C). In addition, there were indications by key informants that the laws or Acts lack effective modes of enforcement by the line ministries 6.3 percent and also that the Act provides legitimacy.

Majority 56.3 percent of the key informants perceived the inadequacies to exist at national level, while 25 percent perceived that the inadequacies exist at local level. The rest of the key informants 18.8 percent indicated that the inadequacies in legislation exist at provincial level (Figure 5.4D). In terms of suggestions, Figure 5.4E shows that the majority of respondents (43.8 percent) proposed that government should revise policies and Acts and enact them into law. Other respondents (31.3 percent) proposed that the government should decentralise CCA coordination in the quest to give power to districts for adaptation funding.

Some of the respondents (12.5 percent) pointed out that decentralisation of CCA would enable institutions mandated to carry out their roles, thereby putting in place effective monitoring and supervisory system.

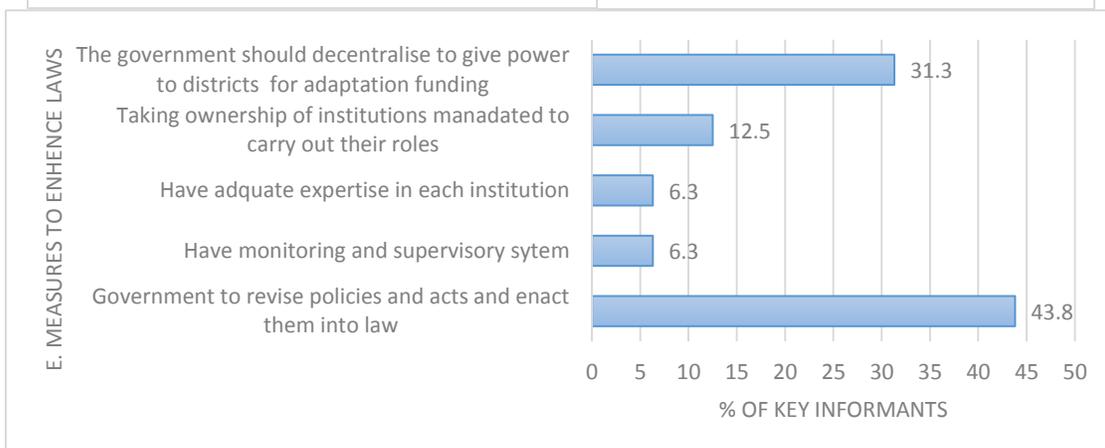
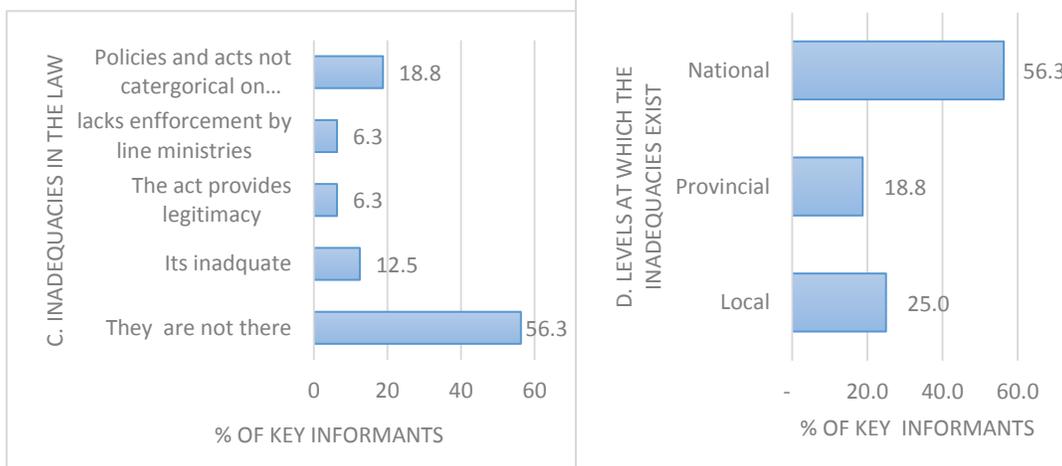
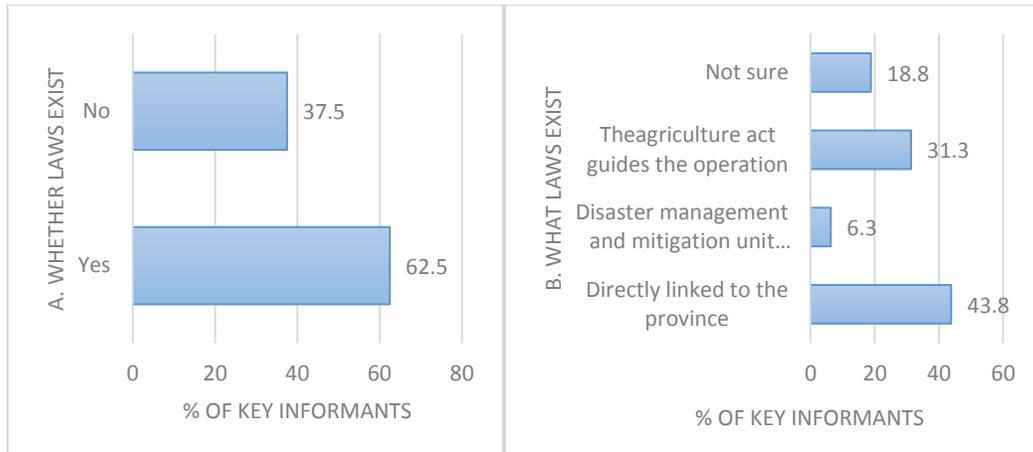


Figure 5.1: Perceptions (A) Whether Binding Laws Existed, (B) What Laws Existed, (C) Inadequacies in the CCA Law, (D) Levels at Which Inadequacies Exist, (E) Measures to Enhance the Laws in Coordinating CCA Activities

Source: **Field data,** **2020.**

5.3 Role of Institutions in Coordinating Climate Change Adaptation Activities in Mkushi District

The questions relating to the role of institutions in coordinating CCA were posed to both smallholder farmers and key informants although the responses were quoted and coded differently in some cases.

5.3.1 Key Informants' Perceptions on Roles of Institutions

Among the institutions involved in the coordination of climate change adaptation activities in Mkushi include; the Ministry of Agriculture (MoA) The Ministry of Local Government and Housing (MLGH), the Ministry of Lands and Natural Resources (MLNR), the Ministry of Finance (MoF) and the Pilot Program for Climate Change Resilience (PPCR) (Table 5.7). Provision of financial aid, monitoring and evaluation of projects in the communities was reported as the most frequent role of the institutions involved in CCA (Refer to Table 5.7). This factor accounted for 50 percent of the responses. Besides that, dissemination of knowledge and promotion of climate smart agriculture through conservation farming had 43.8 percent responses. Further, institutions were used as a conduit of finances to the affected communities which had the least representation of 6.3 percent.

With regard to how the institutions coordinate CCA activities, community-based capacity building and awareness through district officers was the most reported role with 50 percent of the key informants asserting it. This is usually done by training smallholder farmers through cooperatives. The other role that was reported is: sensitization to masses through radio and television, technical development in crop and seed varieties; and financing, supervising and monitoring. However, a few small holder farmers get to know about the weather, rainfall patterns for each season through radio and television while many of them is through agriculture camp officers interface. The sensitization is done mostly before and during the agriculture season.

Table 5.6: Institutional roles and how coordination is done in CCA

Institutions Involved	Institutional roles			CCA activities		
		Freq.	Percent		Freq.	Percent
MoF MLGH	To provide financial aid	6	37.5	Community based capacity building through district officers	3	19.1
MLNR & MLGH	Monitoring and evaluation of projects in communities	2	12.5	Community awareness through district officers	5	31.8
MLNR	Disseminate knowledge on CCA	4	25.0	Sensitization to masses through print and electronic media	3	18.8
MACO & PPCR	Promote climate smart agriculture through conservation farming	3	18.8	Technical development in crop and seed varieties	3	18.8
MoF & MLGH	It is a conduit of finances to affected communities	1	6.2	Financing	2	12.5

Source: Field Data, 2020

It is tenable from the results that the mode of knowledge dissemination is done through the agriculture extension officers who have an interface with farmers but constrained by funding by the central government.

5.3.2 Farmers' Perceptions on Roles of Institutions

With regards to the institutions involved in coordinating CCA in Mkushi, 79.9 percent of respondents claimed that it was the Ministry of Agriculture and Cooperatives 4.2 percent affirmed farmer cooperatives, 0.7 percent said it was NGOs, 9.5 percent said that they were not sure while 5.6 percent of respondents said none.

On the other hand, while the key informants indicated that provision of financial aid, monitoring and evaluation of projects in the communities was the most frequent role of the institutions involved in CCA, most of the farmers themselves indicated training as the main role of the institutions 70.8 percent. About 14.6 percent of respondents indicated that no role is played by

the institutions and 9 percent of respondents indicated that the Ministry of Agriculture provides pesticides in times of pests out breaks. In addition, 4.9 percent of respondents indicated that the institutions provide drought tolerant seeds while 0.7 percent of respondents reported that they provide boreholes (5.4A). The respondents were also asked to indicate how long the institutions had been responsible for coordinating CCA activities. According to Figure 5.3B, 4-7 years was the most reported 24.3 percent, followed by 8-12 years 22.9 percent. In addition, 19.4 percent of respondents reported that they were not sure while 16 percent reported that they had coordinated CCA from 2011-2014.

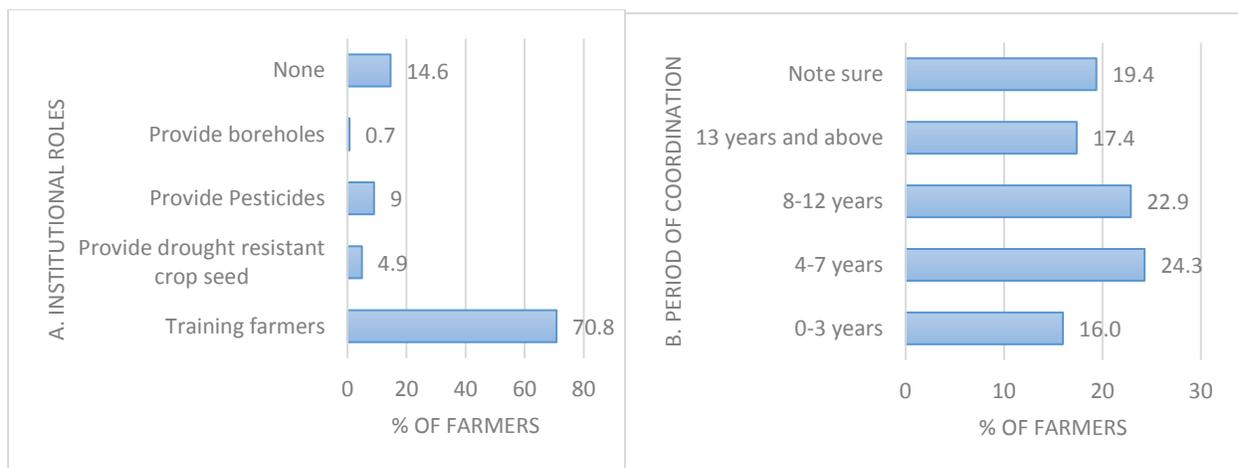


Figure 5.2: Farmers' Perceptions on (A) Roles by Institutions-Farmers, (B) Period of Coordination CCA Activities

Source: Field Data, 2020

The 16 key informants were also asked what they thought could be done for the institutions coordinating climate change adaptation activities. Some of the key informants (37.5 percent) indicated that there should be matching of policy and financial support for CCA activities. This was followed by an indication to increase monitoring and supervising of adaptation activities for sustainability. Furthermore, the institutions are constrained by funding for them to implement the CCA activities and monitor their performance as in being sustainable.

5.4 Institutional Effectiveness in Coordinating Climate Change Adaptation Activities

In order to measure the institutional effectiveness in coordinating climate change adaptation activities, the following measures (or markers for effectiveness) were used in this study, namely; training of local farmers, funding communities, encouraging smart agriculture, promoting conservation farming, mobilizing funds, promoting drought tolerant crops and agro-forestry,

building capacity to the zones and cooperatives, knowledge transfer, establishment of local institutions, provision of pesticides, provision of irrigation facility, and technical support. The analyses were conducted using a Chi-square to assess the institutional effectiveness of CCA activities from both farmers' and key informants' points of view. Data collection was done on the ordinal scale of measurement and for each of the measures highlighted, rankings were used in the assessment of the institutional effectiveness in coordinating CCA activities. These were; not sure (1), not effective (2), moderately effective (3), Effective (4), and Very effective (5) on a 5-pointer Likert Scale.

5.4.1 Measuring the Effectiveness of CCA Activities in Mkushi District

5.4.2 Training of Smallholder Farmers

Table 5.8 shows the perceptions of smallholder farmers and key informants with regard to institutional effectiveness in training of smallholder farmers. Most of the respondents felt institutions were effective in training of local farmers (50 percent for key informants; 36.8 percent for smallholder farmers). The data showed that the key informants' perceptions ranking on the effectiveness of CCA activities was 25 percent for Not sure and 25 percent for very effective responses respectively while Not sure response (24.3 percent) was reported by smallholder farmers. The hypotheses being tested are; (1) the training of smallholder farmers in CCA in Mkushi is effective as perceived by key informants and (2) the training of smallholder farmers towards CCA in Mkushi is not effective as perceived by smallholder farmers. In ranking, the variables used to run the Chi-square at 0.05 significance level were Not sure, Not effective, Moderately effective, Effective and Very effective responses (Refer to Table 5.8). Therefore, since the Chi-square P-value (0.368) for key informants is greater than 0.05 significance level, we reject the null hypothesis that training of smallholder farmers is effective for CCA activities in Mkushi District and accept the alternative of farmers' perception that the training of farmers towards CCA activities in Mkushi is not effective.

Table 5.7: Training of Local Farmers to Adapt and Detect Early Warning Signs of Droughts, Diseases and Poor Rainfall or Floods

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	4	25.0	25.0	25.0	35	24.3	24.3	24.3
Not effective	0	0.0	0.0	25.0	11	7.6	7.6	31.9
Moderately effective	0	0.0	0.0	25.0	18	12.5	12.5	44.4
Effective	8	50.0	50.0	75.0	53	36.8	36.8	81.2
Very effective	4	25.0	25.0	100.0	27	18.8	18.8	100.0
Total	16	100.0	100.0	250	144	100.0	100.0	281.8
Chi-square Test for key informants				: Value= 2.000 df=2	p-value=0.368			
Chi-square Test for smallholder farmers				: Value= 36.833 df=4	p-value=0.001			

Source: Field Data 2020

The results show that key informants found the training conducted by institutions to be effective ($X^2 = 2.000$; $df=2$; $P\text{-value}=0.368$). Contrasting results were obtained from the Chi-square test conducted for farmers ($X^2 = 36.833$; $df=4$; $P\text{-value}=0.001$) who accepted that the training of smallholder farmers was not effective. On the other hand, one farmer attested to the fact that “The camp and extension officers are not enough as one extension officer has 3000 farmers in each zone and these extension officers have no funds to carry out their work, so for them to attend to us we contribute money to buy fuel for them.”

5.4.3 Funding Communities Affected by Climate Change Risks

Table 5.9 show the perceptions of farmers and key informants with regard to institutional effectiveness in funding communities. For farmers, the most common ranking was *not effective* 35.4 percent, while that for key informants was equally distributed over *not effective* and *not sure* each with 31.3 percent. The farmers’ perceptions ranking for *not sure* responses were 26.4 percent for each ranking while the responses of the key informants for *moderately effective* and *effective* accounted for 18.8 percent each respectively (Refer to Table 5.9). The hypotheses being tested are; (1) the funding of communities affected by climate change in Mkushi is effective as perceived by key informants and (2) the funding of communities affected by climate change in Mkushi is not effective as perceived by farmers. Since the P-value for both key informants and farmers is less than 0.05 significance level, we accept that funding of communities affected by

climate change is not effective by institutions and reject that funding of communities affected by climate change is effective.

Table 5.8: Funding of Communities Affected by Climate Change Risks

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	5	31.2	31.2	31.2	38	26.4	26.4	26.4
Not effective	5	31.2	31.2	62.5	51	35.4	35.4	61.8
Moderately effective	3	18.8	18.8	81.2	34	23.6	23.6	85.4
Effective	0	0.0	0.0	81.2	17	11.8	11.8	97.2
Very effective	3	18.8	18.8	100.0	4	2.8	2.8	100.0
Total	16	100.0	100.0	355.9	144	100.0	100.0	37.8
Chi-square Test for key informants: Value= 23.132					df=3	p-value=0.002		
Chi-square Test for farmers : Value=7.181					df=4	p-value=0.001		

Source: Field data, 2020

The results show that key informants perceived that funding to communities affected by climate change risks not to be effective ($X^2 = 8.132$; $df=3$; $P\text{-value}=0.002$). Similarly, smallholder farmers perceived that funding of communities affected by climate change was not effective ($X^2 = 7.181$; $df= 4$; $P\text{-value}=0.001$). This implied that both key informants and farmers were not content with the funding to communities affected by climate change risks in Mkushi. One of the of the key informants observed that “*The reduction of budget allocation to the Ministry of Agriculture of late has affected the operation in Mkushi District as the district depend on cooperatives’ contributions and for the whole year 2019 only ZMW10,000 was received in December.*” The key informant further pointed out that this is evident in the outbreak of fall army worms where many smallholder farmers have no funds nor receive funds from government which makes them loose their crops.

5.4.4 Encourage Climate Smart Agriculture and Crop Diversification

Table 5.10 shows the perceptions of farmers and key informants with regard to institutional effectiveness in encouraging climate smart agriculture and diversification. For the farmers, the most common ranking *moderately effective* (35.4 percent), while that for key informants was *not sure* (31.3 percent). The second most common ranking by farmers and key informants were *not sure* (25.2 percent) and *moderately effective* (25 percent), respectively.

The hypotheses being tested are; (1) encouraging of climate smart agriculture and crop diversification in Mkushi is effective as perceived by key informants and (2) encouraging of climate smart agriculture and crop diversification in Mkushi is not effective as perceived by smallholder farmers. Since the P-value for key informants is greater than the 0.05 significance level, we reject that encouraging of climate smart agriculture and diversification is effective and accept the alternative hypothesis that encouragement of climate smart agriculture and crop diversification among smallholder farmers is not effective in Mkushi.

Table 5.9: Encourage Climate Smart Agriculture and Crop Diversification

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	5	31.2	31.2	31.2	41	28.5	28.5	28.5
Not effective	3	18.8	18.8	50.0	33	22.9	22.9	51.4
Moderately effective	4	25.0	25.0	75.0	40	27.8	27.8	79.2
Effective	2	12.5	12.5	87.5	29	20.1	20.1	99.3
Very effective	2	12.5	12.5	100.0	1	0.7	0.7	100.0
Total	16	100.0	100.0	343.7	144	100.0	100.0	358.0
Chi-square Test for key informants: Value= 2.125 df=4 p-value= 0.713								
Chi-square Test for farmers : Value= 45.497 df=4 p-value= 0.001								

Source: Field data, 2020

The results show that key informants found that encouraging climate smart agriculture and crop diversification to be not effective ($X^2 = 2.125$; $df=4$; $P\text{-value}=0.713$). Contrasting results were obtained from the Chi-square test conducted for farmers ($X^2 = 45.497$; $df= 4$; $P\text{-value}=0.001$). This implied that of the two groups, only key informants were not content with the results of institution’s encouraging climate smart agriculture and crop diversification.

However, the key informant from the Ministry of Agriculture acknowledged that “*There are numerous challenges faced by smallholder farmers to adopt climate smart agriculture due to low capacity of specialized officers at the district level such as Extension methodologists, Farm management officers, Irrigation officers, Nutritionist and Climate change specialists.*” This was reported to have made it difficult for smallholder farmers to adapt to CCA.

5.4.5 Promote Conservation Farming

Table 5.11 shows the perceptions of farmers and key informants with regards to institutional effectiveness in promoting conservation farming. While the majority of the smallholder farmers (36.1 percent) reported *effective*, the majority of the key informants (43.8 percent) reported *not sure*. The proportion of farmers that reported *very effective* was 20.8 percent indicating second largest under this category of respondents. On the other hand, an equal proportion of key informants reported *effective* and *very effective* (each with 18.8 percent). The hypotheses being tested are (1) the promotion of conservation farming in Mkushi is effective as perceived by key informants and (2) the promotion of conservation farming in Mkushi is not effective as perceived by farmers. Since the P-value (0.165) of the Chi-square for the key informants is greater than 0.05 significance level, we reject that promotion of conservation farming methods is effective and accept the alternative by farmers that the promotion of conservation farming methods is not effective in Mkushi.

Table 5.10: Promoting of Conservation Farming Methods

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	7	43.8	43.8	43.8	27	18.8	18.8	18.8
Not effective	2	12.5	12.5	56.2	10	6.9	6.9	25.7
Moderately effective	1	6.2	6.2	62.5	25	17.4	17.4	43.1
Effective	3	18.8	18.8	81.2	52	36.1	36.1	79.2
Very effective	3	18.8	18.8	100.0	30	20.8	20.8	100.0
Total	16	100.0	100.0		144	100.0	100.0	266.8
Chi-square Test for key informants: Value= 6.500					df=4	p-value= 0.165		
Chi-square Test for farmers					: Value= 31.625	df=4	p-value= 0.001	

Source: Field Data, 2020

The results show that key informants found the conservation farming methods promoted in Mkushi to be not effective ($X^2 = 6.500$; $df=4$; $P\text{-value}=0.165$). Contrasting results were obtained from the Chi-square test conducted for farmers ($X^2 = 31.625$; $df= 4$; $P\text{-value}=0.001$). on the contrary, smallholder farmers accepted that promotion of conservation farming among them is effective. However, one smallholder farmer insisted that, “*Conservation farming is very labour intensive and the government does not reciprocate in giving good price to the produce of such*

kind of farming hence many of us do not practice it despite it being promoted among smallholder farmers in Mkushi.

5.4.6 Mobilizing Funds for Communities Affected by Climate Change Effects

Table 5.12 shows the perceptions of smallholder farmers and key informants with regard to institutional effectiveness in mobilizing funds for the affected communities. While the majority (36.1 percent) of the smallholder farmers reported *not sure*, the majority of the key informants reported *not sure*, *effective* and *very effective* in equal proportions of 25 percent for each response. Smallholder farmer’s rankings were seconded by *moderately effective* (12.5 percent), while that of key informants was seconded by *not effective* and *moderately effective* with each response category having a proportion of 12.5 percent. The hypotheses being tested are; (1) the mobilization of funds for communities affected by climate change effects in Mkushi is effective as perceived by key informants and (2) the mobilization of funds for communities affected by climate change effects in Mkushi is not effective as perceived by smallholder farmers. Since the Chi-square P-value (0.002) for key informant and (0.001) for smallholder farmers are both less than 0.05 significance level, we accept that mobilization of funds for affected communities is not effective and reject that the mobilization of funds for affected communities is effective.

Table 5.11: Mobilizing Funds for Communities Affected by Climate Change Effects

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	4	25.0	25.0	25.0	52	36.1	36.1	36.1
Not effective	2	12.5	12.5	37.5	25	17.4	17.4	53.5
Moderately effective	2	12.5	12.5	50.0	35	24.3	24.3	77.8
Effective	4	25.0	25.0	75.0	31	21.5	21.5	99.3
Very effective	4	25.0	25.0	100.0	1	0.7	0.7	100.0
Total	16	100.0	100.0	287.5	144	100.0	100.0	691.7
Chi-square Test for key informants: Value = 38.171 df=4					p-value = 0.002			
Chi-square Test for farmers : Value = 47.181 df=4					p-value = 0.001			

Source: Field Data, 2020

The results show that key informants found that the mobilization of funds for CCA activities to be effective ($X^2 = 38.171$; $df=4$; $P\text{-value}=0.002$). Similar results were obtained from the Chi-

square test conducted for smallholder farmers ($X^2 = 47.181$; $df = 4$; $P\text{-value} = 0.001$). This implied that both key informants and farmers were content with the mobilization of funds for CCA activities. One smallholder farmer asserted that, “*The cooperative has no capacity to mobilize funds for all the members but only a few as not all are able to make contributions unless the subsidies which others fail to pay too*”. This meant that failure to pay, the smallholder farmers especially those who have no access to subsidised farming inputs were threatened with food insecurity. One of the smallholder farmer observed that even though some smallholder farmers opt to do gardening and charcoal production, they were not sustainable therefore, the implication is that the diversified production as a way of adaption strategy is not actualized.

5.4.7 Promote Horticulture and Drought Resistant Crops

Table 5.13 shows the perceptions of farmers and key informants with regards to institutional effectiveness in promoting horticulture and drought tolerant crops. While the majority of the smallholder farmers (28.5 percent) reported *not sure*, the majority of the key informants (44.4 percent) reported *not effective*. The smallholder famers’ most common response was *moderately effective* consisting of 27.8 percent, while that of key informants were *effective* and *very effective* each with having 22.2 percent. The hypotheses being tested are; (1) the promotion of horticulture and drought tolerant crops in Mkushi is effective as perceived by key informants and (2) the promotion of horticulture and drought resistant crops in Mkushi is not effective as perceived by smallholder farmers. Since the Chi-square P-value (0.129) of the key informants is greater than 0.05 significance level, we reject that promotion of horticultural and drought resistant crops has been effective towards ACC in Mkushi and reject the alternative by farmers that promotion of horticulture and drought resistant crops is not effective towards ACC in Mkushi.

Table 5.12: Promote Horticulture and Drought Resistant Crops

Rank	Key Informants				Farmers			
	Freq.	%	Valid %	Cumulative %	Freq.	%	Valid %	Cumulative %
Not sure	7	43.8	43.8	43.8	41	28.5	28.5	28.5
Not effective	4	25.0	25.0	68.8	33	22.9	22.9	51.4
Moderately effective	1	6.2	6.2	75.0	40	27.8	27.8	79.2
Effective	2	12.5	12.5	87.5	29	20.1	20.1	99.3
Very effective	2	12.5	12.5	100.0	1	0.7	0.7	100.0
Total	16	100.0	100.0		144	100.0	100.0	
Chi-square Test for key informants: Value = 7.125 df =4 p-value = 0.129 Chi-square Test for farmers : Value = 36.972 df =4 p-value = 0.001								

Source: Field Data, 2020

The results show that key informants found the promoting of horticulture and drought resistant crops to be not effective ($X^2 = 7.125$; $df=4$; $P\text{-value}=0.129$). Contrasting results were obtained from the Chi-square test conducted for smallholder farmers ($X^2 = 36.92$; $df= 4$; $P\text{-value}=0.001$). This implied that of the two groups, only key informants were not content with the promoting of horticulture (the growing of different kinds of vegetables for both consumption and income generation) and drought tolerant crops (such as cassava). This was in affirmation of the project done in 2017 by the Conservation Farming Unit under the Ministry of Agriculture which ran for a year. This was done to alleviate the low rainfall by hand basin and pot-holing by smallholder farmers, this was not sustainable as CCA because the farmers after the funder pulled out so did they stop practicing it. However, one farmer disagreed in that “*The government does not consider drought resistance seed when they distribute seeds under the farmer input support programme*”. This means that smallholder farmers who are dependant on rain fed agriculture face internment as the distribution of inputs by the government through the MACO who do not take that into consideration.

5.5 Challenges and Recommendations

To understand the challenges that were faced in coordinating climate change adaptation activities, key informants and smallholder farmers were asked to state the challenges they encountered with regards to Climate Change Adaptation activities and what they would recommend to alleviate such challenges (Refer to Table 5.14). The results according to key

informants showed that laws on CCA had some loopholes. The challenges faced by both key informants and smallholder farmers were reported to be severe especially in the adapting to CCA. The severity of challenges was attained by the respondents rating on the challenges faced and the priority in rating was by the majority responses towards the recommendation of the CCA.

Table 5.13: Challenges and Recommendations

Key informants' Perspective			
Challenges Faced	Severity Rating (%)	Recommendations	Priority
Inadequate resources (materials such as seeds and fuel)	25.0	Matching policy and financial support	37.5
Low adoption levels by farmers	6.3	Monitoring and supervising of adaptation activities for sustainability	25.0
Lack of financing and literacy	25.0	Institutional awareness of the policy on climate change.	18.8
Lack of implementation at district level due regular transfers of personnel	43.8	Promote unit and cooperation within the communities and increase funding	12.5
		Document and report as a district to other stake holders to come on board to help funding.	6.3
Smallholder farmers' Perspective			
Challenges Faced	Severity Rating (%)	Recommendations	Priority
Lack of finances	36.1	There should be available funds in the institutions to benefit farmers in CCA	28.0
High price of pesticides	6.9	There should be subsidies for farmers to afford buying them	39.5
Lack of knowledge and information on climate change	38.2	Increase human resources with expertise on CCA in the institutions .	30.3
Lack of irrigation system and late delivery	10.4	Fund cooperatives to have communal	2.2

of inputs		irrigation schemes and early delivery of inputs	
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Source: Field Data 2020

Form the key informants’ point of view, lack of implementation of CCA activities at District level due to regular transfers of personnel was the most severe challenge faced by the local government and housing (the local authority) which help in planning for CCA. The severity of this challenge was represented by a ranking of 43.8 percent. Other challenges as pointed out by key informants in order of severity were: Inadequate resources (materials such as seeds and fuel) (25 percent), Lack of financing and literacy (25 percent), and Low adoption levels by farmers (6.3 percent). From the farmers’ point of view, lack of knowledge and information on climate change was the main challenge with a severity rating of 38.2 percent followed by lack of finances (36.1 percent). Other challenges indicated by farmers were lack of irrigation system and late delivery of inputs and high price of pesticides (Mertz *et al.*, 2009b; Funder *et al.*, 2017)

To alleviate the highlighted challenges, these measures in order of priority were proposed by the key informants: Matching policy and financial support (37.5 percent); Monitoring and supervising of adaptation activities for sustainability (25 percent); Institutional awareness of the policy on climate change (18.8percent); Promote unit and cooperation within the communities and increase funding (12.5 percent); Document and report as a district to other stake holders to come on board to help funding (6.3 percent). Furthermore, to alleviate the highlighted challenges by farmers, the measures in order of priority were proposed: Subsidize and pesticides and insecticides for farmers to afford to buy them (39.5 percent), Increase human resources with expertise in CCA in the institutions (30.3 percent), There should be available funds in the institutions to benefit farmers in CCA (28.0 percent), Fund cooperatives to have communal irrigation schemes and early delivery of inputs (2.2 percent).

CHAPTER SIX: DISCUSSION OF RESULTS

6.0 Introduction

This chapter provides the details of the findings presented in Chapter Five, which link them to the research objectives and research questions. This research tried to analyse the strength of local establishments in their role towards coordinating climate change natural processes for adaptation in Mkushi. Institutions' effectiveness was measured using the following variables: training local farmers, financing communities, encouraging climate smart agriculture, raising funds, capacity building of areas and cooperatives, knowledge transfer, establishment of local institutions, supply of pesticides and irrigation facilities, and technical support.

6.1 Loopholes in The Legislation on the Coordination of Climate Change Activities in Mkushi District

This study revealed that all the respondents became aware of climate change through government officials (agricultural extension worker) and through community meetings (cooperatives). Key informants reported that small holder farmers were aware of climate change activities and coordination of climate change activities in Mkushi District. This finding appears to be in line with Funder *et al.*, (2017) who conducted a study in Kazungula and Sesheke Districts and found that the CCA is enhanced by the foundations such as government authorities, local government, NGOs and civic companies in providing awareness and technological documentation as well as funding towards short and long term CCA projects among smallholder farmers. This study also found that the way relevant institutions regulate and interaction both amongst themselves and with external actors in coordinating climate change activities is a problem. In understanding the understand the loopholes in legislation and what could be done to avert them regarding the loopholes in the legislation and coordination of climate change activities, the majority (62.5 percent) of the respondents believed that institutions involved in CCA have binding laws. On the contrary, a few (37.5 percent) of the key informants argued that institutions engaged in involved in CCA do not have binding laws. Slightly half (56.3 percent) of the respondents felt that the legislation on the coordination of CCA is sufficient and that there were no inadequacies while other respondents composing of 18.8 percent reported that the Policies and Acts are there but not adequately enforced. They further pointed out that the current laws on CCA do not sufficiently address the critical issues on climate change. In the quest to

avert the loopholes in the legislation of CCA activities, a few Some of the respondents (12.5 percent) decentralisation in the formulation of the laws would be ideal in addressing the loopholes. When it comes to the Bill concerning the CCA activities, smallholder farmers were generally more concerned about other CCA activities and that law was reported in the coordination of the activities. Further they argued that laws that are formulated and the local level can adequately take into account of local contexts regarding CCA. This argument can be supported in that different environment require different climate change adaptation activities. A number of literature have shown that government and its key stakeholders play a key role in the formulation of laws and coordination of CCA at all levels (Funder *et al.*, 2017). With regards to the loopholes on the coordination of CCA in Mkushi District, this study showed mixed views on the legislation, coordination of CCA activities especially among smallholder farmers. While the varying views among the key informants can be attributed to their expertise and level of engagement in the formulation of CCA laws. Therefore, it is imperative to have concise laws on CCA activities if effective coordination at all levels is to be achieved.

6.2 Role of Institutions in the Co-ordination of CCA Activities in Mkushi District

From the key informants point of perspective, institutional roles reported included; dissemination of knowledge and promotion of climate smart agriculture through conservation farming, provision of fiscal aid and monitoring and evaluation of projects in the residential districts and that they were a conduit of finances for affected communities. Among them, the provision of financial assistance and the dissemination of information on Community projects was the most notable. The National Climate Change Policy (2016) recognizes that awareness and education through the dissemination of climate change information is needed to mitigate and adapt. Agrawal *et al.*, (2009) agrees that, information gathering and dissemination, resource mobilization and allocation, skills development and content building, providing leadership, and connecting to other decision making depends on the institutions present in the region. The researcher observed that there are co-operatives in the study area. However, many smallholder farmers to access the extension services they have to contribute funds for fuel for a camp officer to provide services in their respective cooperative zones.

In terms of how the institutions coordinated the CCA activities, communitybased capacity building was found to be the main approach, because the climate impacts are locally understood

and experienced before it come to the nation as a whole. Agrawal (2008) conducted a study in Zimbabwe which found that adaptation practices among smallholder farmers depend on their access to specific institutional arrangements since adaptation never occurs in an institutional vacuum. Agrawal (2008) further pointed that institutional connections provide households and communities greater flexibility in their choice of diversification and adaptation strategies. The most recommended option was that of matching policy and the financial support provided to them in their farming activities especially with regard to CCA response. The study by Mpasuka (2013) on policy framework in Malawi found that most institutions have great challenge of finances as the policies state, the inadequacy of funds to implement strategies for adaption has failed, in many instances, the finances budgeted for by each line ministry towards CCA does not meet the demand in time of emergencies such us floods, droughts and poor rainfall. This agrees to the key informant's solution to challenges of matching policies and funding for institutions to be effective. This means that participatory approach in CCA is crucial in engaging communities toward the process of technology receptivity and sustainable CCA activities. Further, it is tenable that, district adaptation funds and performance-based grant structures where organizations and communities propose projects, and receive funding according to pre-determined criteria, this enhances adaptation efforts relevant to the local communities and reduces time and cost of getting funds into action for the beneficiaries.

On the other hand, the farmers reported training of farmers, provision of drought resistant crop seed, pesticides and boreholes as the roles of the institutions coordinating CCA activities. Of these factors, training of farmers was the most significant to farmers. Rosemary (2011) observed that adaptation strategies based on knowledge and lessons learned promotes sustainable agricultural practices and climate change adaptation strategies. However, this can be refuted in that it is hard to coordinate CCA because some farmers are illiterate such that sending messages for any warning be it on floods, droughts are not possible as they need interface. This is hindered by luck of funding to the extension officers who are also few (1 to 3000 farmers) who were unable to reach many farmers. The farmers also provided possible solutions and suggested that institutions should improve their coordination of CCA activities through institutional capacity building with new criteria of decision making towards sustainable adaptation activities for the communities.

6.3 Legislation on the Coordination of Climate Change Activities in Mkushi

Five measures of effectiveness of CCA activities with regard to legislation were used in this study: Do institutions have binding laws or policies on coordination of climate change adaptation activities; If the institutions have the binding laws what is the explanation for why they have them; What inadequacies exist in the law for coordinating climate change activities and the levels at which they exist, and what should be done to enhance the laws in coordinating climate change adaptation activities.

From the key informant's point of view, the majority expressed knowledge of existing binding laws or policies on CCA activities. While that was the case, however, some respondents indicated that the institutions do not have which may signal that while the policies or laws may be in existent, there may not be much sensitisation within the institutions. Arguably, finance and planning mechanism for CCA is anchored in the architecture of government decentralisation and through which climate funds reach local communities. The study further revealed that, the most common reason provided for why the laws existed was that they were directly linked to the province and additionally, the indication that the agriculture act guides the operations of the CCA activities in the agriculture sector. The perceived inadequacies from the key informants' perspective was beyond just the inadequacies in terms of policies not being categorical or specific enough to the CCA activities, but that on the most part, they did not exist at all.

Moreover, the indication was that the inadequacies existed mostly at national level. Nest and Chipu and Paramu (2017) suggested that lack of constitutional embedded laws on the operation of institutions coordinating CCA leads to inefficiency in the delivery of services for the most vulnerable communities. Some measures were proposed to enhance the laws in coordinating CCA activities with the largest representation being: government to revise policies and acts and enact them into law 43.8 percent; and that the government should decentralise the operation of the law and the National Climate Change and Development Council (NCCDC) to give power to districts for adaptation funding 31.3 percent. Similar results were found by (UNDP-UNEP, 2011), a country's adaptation response should be formulated as part of broader policies or laws for development, in that, institutions that carryout the mandate should have climate experts and well financed with the assessment being done by the local communities who face the effects.

Many of the CCA have no ownership leading to unsustainability of CCA projects in the areas of action.

Ampaire *et al.* (2017) refute the (NAPA, 2007) that “decentralization will be transparent in policy making and implementation with effective community participation in decision making and administering of their local affairs while maintain sufficient linkages between the centre and the periphery.” They argued that it is a far-fetched reality as most decisions are made by the central government and mostly by the DMMU towards climate change risks and disasters such as floods, droughts, low rainfall to vulnerable communities who have no capacity to adapt. This is evidenced by the once off adaptation measure on conservation farming by farmers in Mkushi by the conservation unit in the ministry of agriculture, this institution coordinated and later on pulled out. Notably, in most cases working with existing community institutions yields positive results, rather than establishing new ones. Therefore, lasting adaptation is achieved when national and district level institutions provide a supporting environment for people’s own adaptation.

This study found that there is lack of connection between national policies on climate change adaptation and the local institutional situation on the ground with limited involvement of local institutions. Meyer (2009) reports that, lack of constitutional legislation creates a vacuum which affects heavily the vulnerable communities. It is thus important that the responses put forward at the national level be rooted in local conditions, recognizing the great damage that climate change causes to livelihoods. Hence the findings suggest that, this can be achieved by giving the local governments and institutions the power to make decisions on the projects by being proactive rather than reactive.

6.4 Institutional Effectiveness in Coordinating Climate Change Adaptation Activities

For both farmers and key informants the ranking of institutions as being Effective was the most common ranking with regards to Training of local farmers. However, the training is not so much as there is no accurate forecast of weather patterns with weak coordination between the metrological department and the ministry of agriculture. Further the field officers are limited with one field officer managing 3000 farmers. Studies by Isaac *et al.*, (2019) on effectiveness of institutions in coordinating CCA reveals that, they were not effective in their roles. The study findings explain that funding of communities was not effective by central government, local

government and actors in spear heading CCA. The reduction of budgetary allocation has made the institutions like MACO to be inefficient in reaching smallholder farmers as acknowledged by the DACO.

6.5 Measuring the Effectiveness of CCA Activities in Mkushi District

In the quest to measure the effectiveness of climate change adaptation (CCA) activities among smallholder farmers in Mkushi district, the study used the following variables; training of smallholder farmers, funding communities affected by climate change risks, encouragement of Climate Smart Agriculture (CSA) and crop diversification, promote conservation farming, mobilising funds for communities affected by climate effects and promote horticulture and drought tolerant crops. The major results for these parameters are discussed as follows:

6.5.1 Training of Smallholder Farmers

With regards to training of smallholder farmers as a measure of effectiveness of CCA activities in Mkushi, majority of the respondents reported that institutions mandated to carry out training activities were effective. This was supported by a quarter of key informants who observed that half of the key informants argued that the training offered to smallholder farmers were very effective. However, the other quarter of the key informants were not sure whether the training for smallholder farmers was effective or not. In ranking, the variables used to run the Chi-square at 0.05 significance level for the key informants, the statistical test results showed that the key informants perceived that the training of smallholder farmers in Mkushi towards CCA activities in Mkushi was not effective (Table 5.8). On the contrary, using the same variable, the Chi-square at 0.05 significance level test results for smallholder farmers showed that the training on CCA activities offered to them by the institutions were effective. However, one smallholder farmers, who had lived for over 30 years in Mkushi District attested to the fact *that “The camp and extension officers are not enough as one extension officer has 3000 farmers in each zone and these extension officers have no funds to carry out their work, so for them to attend to us we contribute money to buy fuel for them.”* Emanating from the results of this study, the opposing responses of key informants and that of smallholder farmers regarding the effectiveness of CCA activities in Mkushi District is of great concern. It can be argued that this shows the gaps in monitoring and follow-ups on the CCA activities after training, arguably by some key informants who were said to be actively involved in the training of smallholder farmers. This result

demonstrates that key informants were not aware whether the training offered were effective or not. However, smallholder farmers reported that the training received on CCA activities were effective and one would agree with them in that they are the actual recipients of the training and do have the first hand information on their effectiveness.

6.5.2 Funding Communities Affected by Climate Change Risks

Current and emerging studies have indicated that funding communities affected by climate change risks is essential (Parry *et al.*, 2009; Scovile-Simonds, 2016). These studies showed that funding is cardinal and should help affected communities to enhance their adaptive capacities in responding to climate change effects. The majority of respondents narrated that funding to communities affected by climate change was low towards CCA activities, provision of pesticides, irrigation systems hence, being poorly ranked. The respondents argued that there was little or no funding towards the victims of climate change effects Nest (2011) observed that the intention of funding towards climate change risks was to enhance institution's ability to adequately respond to climate change effects, helping the victims and helping the coordination of CCA activities.

Lidunda (2011) projected that Zambia in general is likely to lose between six and eight billion United States Dollars in the next 10 years (between 2011 and 2020) if sustainable interventions are not made in addressing the impact of climate change through institutional and political governance dynamics of adaptation processes. However, a study by Funder *et al.*, (2017) found that there was funding of some Zambia's adaptation measures that include; promotion of irrigation and efficient use of water resources, strengthening early warning systems and preparedness, and using Geographical information systems (GIS) remote sensing in mapping of drought and flood prone areas. On the contrary, this was not the case in Mkushi District even if it is being done in other parts of the country to the local communities towards CCA activities. As a result, some smallholder farmers who fail to withstand extreme climate change effects such as prolonged droughts and drying out of streams they depend on for water supply, resort to charcoal production in the quest to sustain their livelihood. In the face of extreme and unpredicted climate change effects on the communities, there is need for robust funding towards affected communities especially in the areas of CCA activities. If this is not attained, the implication

would be that communities affected by climate change effects would continue to suffer from the effects of climate change.

6.5.3 Encouraging Climate Smart Agriculture and Crop Diversification

The encouragement of climate smart agriculture and crop diversification was one of the variables for the measuring effectiveness of CCA activities in Mkushi District among smallholder farmers. this study. Smallholder farmers ranked this variable to be moderately effective while key informants most reported not to be sure. This is so because most farmers have no capacity to practice climate smart agriculture due to its labour intensity and costs attached to it. The promotion of conservation farming was fairly ranked by smallholder farmers while the key informants were mostly not sure and thus lowly ranked this aspect. The results therefore show how low adaptive levels are and how weak institutions are towards coordinating CCA. In all of these situations, the responses from the two parties were independent. Hence, the existing issues underlying the formal institutional structures at different levels of government might hinder the decisions and benefits at the micro level. Thus, more consideration should be given to the importance of local institutional coordination of climate change adaptation activities for the benefits of local people.

6.5.4 Promote Conservation Farming

The promotion of conservation farming among smallholder farmers in measuring CCA effectiveness, the majority of smallholder farmers reported it to be very effective. This was supported by one of the key informants who observed that most of the farmers were now growing drought tolerant crops in view of prolonged droughts in the area. For key informants' responses, a statistical test was conducted using the chi-square at 0.05 level of significance, showed that promotion of conservation farming among smallholder farmers was not effective while the same test when conducted on smallholder farmers showed that promotion of conservation farming was effective. However, one smallholder farmer insisted that, *“Conservation farming is very labour intensive and the government does not reciprocate in giving good price to the produce of such kind of farming hence many of us do not practice it despite it being promoted among smallholder farmers in Mkushi.* This implies that there would be few farmers who would adapt conservation farming due to its cost implications especially farmers already facing financial constraints.

6.5.5 Mobilization of Funds for Communities Affected by Climate Change Effects

Mobilising of funds for CCA activities and promotion of horticulture and drought tolerant crops were poorly ranked by both farmers and key informants and in both cases there was an association or linkage between the responses from the two parties. According to the study done by Bahadur and Bhandari (2008) pointed out that, local institutions help in mobilizing resources, training and establishment of local buffer zones that help in sustaining the adaptation activities after the main project ends. Furthermore, they conceded that vulnerable communities lack access to resources due to weak institutional support. Therefore, investments in institutional structures and systems that support the interactions of programs as a means to strengthen local climate change adaptation are important to ensure the continuation of both short and long term social protection programs in the future for affected communities.

6.5.6 Promote Horticulture and Drought Tolerant Crops

On the promotion of horticulture and drought tolerant crops as a measure of effectiveness of CCA activities, smallholder farmers perceived that it was not effective. This was the same perception which was held by the majority of the key respondents. This result was consistent with the chi-square test at 0.05 significance level that showed that promotion of horticulture and drought tolerant crops was not effective towards CCA activities in Mkushi District. This result is consistent with the study done by Conservation Farming Unit under Ministry of Agriculture (2017). This study found that promotion of horticulture and drought resistant crops as a CCA strategy because once a project ends, farmers could not continue horticulture and growing of drought tolerant crops, hence, not being sustainable. One of the smallholder farmers, who had lived for more than 40 years in Mkushi District explained that the the government does not consider drought resistance seed when they distribute seeds under the farmer input support programme, hence not being effective. One would argue therefore that the inclusion of horticulture and drought tolerant crops in the farmer input support programme would expedite the rate of adoption as CCA alternative for smallholder farmers. In this regard, this study showed that the promotion of horticulture and drought tolerant crops as a CCA was not effective.

6.6 Challenges and Recommendations

This study reviewed that both smallholder farmers and keys informants were faced with challenges in the implementation of CCA activities in Mkushi District and they significantly varied in their severity (Refer to Table 5.14). The majority of key informants reported that lack

of implementation of CCA activities at the District level, low adoption of CCA activities and low funding towards CCA activities in the district were the major challenges. On the other hand, smallholder farmers reported inadequate funds, lack of knowledge and information on climate change (Refer to Table 5.14). Therefore, it can be contended that challenges faced by both smallholder farmers and key informants could be the major reason why promotion of conservation farming, encouragement of climate smart agriculture and crop diversification among others were not effective. This implies that if challenges are not addressed, the CCA activities will continue to be poorly adapted by smallholder farmers.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This study sought to examine the effectiveness of local institutions in coordinating climate change activities for adaptation in the Mkushi District. It also explored loopholes in the legislation on the coordination of climate change activities in Mkushi District. Further, it examined the role of institutions in coordinating climate change natural processes for adaptation by ranking the level of effectiveness of climate change coordination from the key informants' point of perspective and that of targeted smallholder farmers.

This study revealed that there were loopholes in the formulation of legislation on the coordination of climate change adaptation activities. The study also revealed that the loopholes in the laws could affect the ways CCA activities were being implemented among smallholder farmers in Mkushi District as they were no binding laws in place. However, some respondents felt that there were felt that the legislation on the coordination of CCA is sufficient and that there were no inadequacies. They explained that the decentralisation in the formulation of the laws was needed if implementation of CCA activities was to be more effective.

With regards to the coordination of CCA in Mkushi District, this study showed mixed views on the legislation, coordination of CCA activities especially among smallholder farmers. Some of the respondents argued that the coordination of CCA activities was effective while others said that it was not. Other respondents, however, observed that managing and adapting to the shocks of climate change demands a well-coordinated institutional with clear laws on how to respond to climate change threats in the agricultural sector. This study further demonstrated that policy

actors are insufficiently involved in policy-making processes at the local level and they seemed to lack sufficient expertise to allow long-term planning for climate change adaptation and mitigation. They also indicated that institutions are moderately effective as they possess immense fiscal challenges which is key to CCA activities in Mkushi District.

With regards to the measurement of effectiveness of CCA activities, the variables used were; training of smallholder farmers, funding communities affected by climate change risks, encouraging climate smart agriculture and crop diversification, promotion of conservation agriculture, mobilisation of funds affected by climate change effects and promotion of horticulture, the study generally showed that they were moderately effective. The results have further shown that funding was critical to the implementation of CCA activities in Mkushi District. With low funding towards CCA activities, existing loopholes in the legislation and coordination of institution involved, the efforts being made to linking climate change institutional coordination to climate change adaptation may not be achieved in Mkushi district.

7.2 Recommendations

The study identified various issues which touch on effective local institutional coordination towards climate change adaptation actions and may affect coping and adaptation planning. Therefore, the study makes recommendations as an approach to improving the institutional coordination of local climate change for adaptation to allow sustainable CCA for Mkushi smallholder farmers. The following recommendation addresses the issues identified.

- i. There is a need to strengthen policy implementation through institutional capacity and sustainability of efforts to adapt to climate change. This should be done by government line ministry (MLNR) and should increase budgetary allocation for climate change-related activities and policy implementations.
- ii. The study established that there should be decentralization and access to funding for district institutions in climate change adaptation activities by central government through expertise in all departments at the district level. This will enhance the coordination and CCA implementation, monitoring and evaluation.
- iii. There is a need to improve technical or capacity systems in institutions to enable interfacing with smallholder farmers, as many of them cannot access climate change

information using electronic media. The government needs to increase capacity building and buy up-to-date equipment with adequate funding for the Department of Agriculture.

- iv. Policies should be enacted through legislation to give institutions the authority to implement their CCA. Through Parliament (Parliament) and enforcement or implementation by the responsible departments.
- v. Further research is needed on the influence of funding on local institutions that coordinate climate change adaptation activities of institutions and NGOs. Conclusions and recommendations can assist in formulating policies to improve CCA.
- vi. Further in-depth researches on institutional effectiveness on funding and mobilization of funds towards CCA should be exercised by different institutions as demonstrated in the work that it impends the institutional capacity. This should be done by analyzing both budget allocation and bilateral financing for climate change-related activities and verifying the major institutions responsible for disbursement of funds.

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APPENDICIES

APENDIX A: QUESTIONNAIRE FOR LOCAL FARMERS

QUESTIONNAIRE FOR FARMERS ON LOCAL INSTITUTIONAL COORDINATION OF CLIMATE CHANGE ADAPTATION ACTIVITIES IN MKUSHI DISTRICT.

Dear respondent,

I am Musa Namasani, a second-year master's student at the University of Zambia in the School of Natural Sciences pursuing a Master of Science in Environmental and Natural Resources Management in the department of Geography and Environmental Studies. I am conducting a research on *Linking local climate change institutional coordination to climate change adaptation in Mkushi district.*

You are kindly requested to answer the questions in this questionnaire. Your participation in this survey is voluntary. This research is purely academic and any information gathered in this survey will only be used for the purposes of research. Please respond as honestly as you can to all the questions. Feel free to make further comments you may want to. The interview is completely confidential and your name will not be recorded in this Questionnaire.

Name of the Numerator:

Name of District:

Date of Survey:

Questionnaire No:

PART A: PERSONAL DETAILS

Q1. Gender.

(a) Male { }

(b) Female{ }

Q2. Age -----

Q3. Marital status.

- (a) Single { }
- (b) Married { }
- (c) Divorced { }
- (d) Separated { }
- (e) Widow { }
- (f) Widowed { }

Q4. Size of your household (Write the number).

- (a) Males { }
- (b) Females { }

Q5. Level of education .

- (a) Primary { }
- (b) Upper basic { }
- (c) Secondary { }
- (d) Tertiary { }
- (e) None { }

Q6. Occupation.....

Q7. What is your monthly income?

Q8. Number of years of residence in Mkushi

PART B: EXAMINE THE ROLE OF INSTITUTIONS IN COORDINATING CLIMATE CHANGE ADAPTATION ACTIVITIES IN MKUSHI

Q 9. What key institutions are present in your area coordinating climate change adaptation activities?

.....
.....
.....

Q 10. What role do these institutions play in coordinating climate change adaptation activities in your area?

- (a) Training farmers
- (b) Provide drought resistant crop seeds
- (c) Provide Irrigation
- (d) Provide pesticides
- (e) Provide boreholes

Q 11. Are you a beneficiary of any of the activities mentioned above?

- (a) Yes
- (b) No

Q 12. If your answer to question 11 is yes, how much do you pay as membership fee?

(Write amount in ZMW) { }

Q 13. How did you come to know about climate change adaptation activities? (Tick all that apply)

- (a)Community meetings { }
- (b) Friend { }
- (c) Government officials { }
- (d) Radio/television { }
- (e) Other { }

Q 14. How long has the institution been coordinating climate change adaptation activities?

.....

Q 15. How are you affected by the following?

(a) Prolonged droughts.....

(b) High temperatures.....

(c) Floods.....

(d) Poor rainfall.....

Q 16. How do you respond to these effects?

(a) Prolonged droughts.....

(b) Pests and diseases.....

(c) Floods.....

(d) Poor rainfall.....

Q17. List three constraints that you face in adapting to climate change?

(a)

(b)

(c)

PART C: RANKING EFFECTIVENES OF CLIMATE CHANGE

Q18. How effective are the institutions in climate change adaptation activities in your area?

(a) Very effective

(b) Moderately effective

(c) Effective

(d) Not effective

(e) Not sure

Q19. Rate how each of the adaptation activity by the institution is coordinated in your local area?
The rating should be done for each activity using the following scale, placing the rating number in the blank boxes. (Very effective [5] Effective [4] Moderately effective [3] Not effective [2] Not sure [1])

Institutional Adaptation activities	Rating
Train the local people with skills to adapt to climate change impacts	
Knowledge transfer from other districts facing the same impacts	
Establish local institution/villagers to help evaluate the impacts and forecasts.	
Provide drought resistant crop seeds	
Provide early maturing varieties of seeds	
Provide pesticides	
Provide Irrigation	
Promote conservation farming methods	
Provide local finances for adaptation and mitigation activities	
Provide technical support and supervise external funding for climate change adaptation and mitigation	
Mobilize funds for disaster, risk reduction and climate change adaptation	

THANK YOU FOR YOUR PARTICIPATION

APPENDIX B: INTERVIEW GUIDE FOR KEY INFORMANTS

KEY INTERVIEW GUIDE

Dear respondent,

I am Musa Namasani a second-year master's student at the University of Zambia in the School of Natural Sciences pursuing a Master of Science in Environmental and Natural Resources Management. I am conducting a research on *Linking local climate change institutional coordination to climate change adaptation in Mkushi district.*

You have been selected by virtue of position. You are therefore, kindly requested to answer the questions in this questionnaire. Your participation in this survey is voluntary. This research is purely academic and any information gathered in this survey will only be used for the purposes of research. Please respond as honestly as you can to all the questions. Feel free to make further comments you may want to. The interview is completely confidential and your name will not be recorded in this Questionnaire.

Name of the Numerator :

Name of District :

Date of Survey :

Questionnaire No. :

INTERVIEW QUESTIONS

Q1. For how long and in which capacity have you worked for this department?

(a) Period (In months):.....

(b) Capacity.....

Q 2. What are the roles of your institution in climate change adaptation activities?

(a) To train members of the affected communities

- (b) To provide financial aid to the affected communities
- (c) To monitor and evaluate the activities
- (d) Act as conduits of finances for adaptation activities
- (e) Promote climate smart agriculture.

Q 3. Explain how your institution coordinate climate change adaptation activities?

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Q 4. In your own view explain how your institution has been coordinating climate change adaptation activities?

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Q 5. May you rank your institutional effectiveness in coordinating climate change adaptation activities using the following; (Very effective [5] Effective [4] Moderately effective [3] Not effective [2] Not sure [1])

Types of climate change adaptation activity	Rating
Training farmers to have skills to adapt and detect early warning signs of droughts, diseases and poor rainfall or floods.	
Building capacity to the zones and cooperatives.	
Funding of communities affected by climate change risks.	
Mobilize funds for risk and Disaster reduction like floods, droughts and pests	
Encourage climate smart agriculture and promote crop diversification.	
Promote farming practices such as; from conventional to conservational farming method	
Promote agroforestry, horticulture and legumes .	

Q 6. What challenges do you face as an institution in coordinating climate change adaptation activities?

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Q 7. What are the inadequacies in the law for coordinating climate change activities in Mkushi?

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Q 8. Are these inadequacies in the law at local, provincial, or national level?

.....
.....

Q 9. What do you suggest should be done to enhance the laws in coordinating climate change adaptation activities?

.....
.....

Q 10. Do the institutions have the binding laws or policies on coordination of climate change adaptation activities

- (a) Yes
- (b) No

Q 11. If your answer is yes for the question above explain how?

.....
.....

Q 12. What do you suggest should be done to institutions in coordinating climate change adaptation activities?

.....
.....

THANK YOU FOR YOUR PARTICIPATION