41/325/2016

Comparative Climate Change and Land management Study Report

Undertaken by:

Zambia Land Alliance (ZLA)

Commissioned by:

ZERO, Zimbabwe

ACRONYMS AND ABBREVIATIONS

AF	Agroforestry
BOZ	Bank of Zambia
CAADP	Comprehensive Africa Agriculture Development Programme
CBOs	Community Based Organisations
CSOs	Civil Society Organisations
ENSO	El Niño Southern Oscillation
FISP	Farmer Input Support Programme
GCM	Global Climate Model
GDP	Gross Domestic Product
GLM	Green Living Movement
GRZ	Government of the Republic of Zambia
ITCZ	Inter Tropical Convergence Zone
MACO	Ministry of Agriculture and Cooperatives
MTENR	Ministry of Tourism Environment and Natural Resources
NGO	Non-Governmental Organisation
NAP	National Agriculture Policy
SPSS	Statistical Package for Social Science
ZERO	Zimbabwe Environment Regional Organisation
ZLA	Zambia Land Alliance

Contents

Definition of Terms

Adaptation: Activities that are implemented that can still provide desired results in spite of the changed climatic conditions
Agro forestry: Trees growing with crops in a mutually beneficial way
Mitigation: Activities and actions to reduce the negative effects of climate change
Chitemene system: Cultural system which involves the cutting and burning of tree branches in order to add soil potash as a control on soil acidity.
Climate variability: Climate variability reflects shorter-term extreme weather events, such the El Niño Southern Oscillation (ENSO) and the La Niña Southern Oscillation (which results in drought). While there is some evidence that climate variability will increase as a result of climate change, many uncertainties remain. **WB 2000**
Climate smart agriculture: is agriculture that sustainably increases productivity, resilience, reduces GHGs and enhances achievement of food security **FAO 2010**

ACKNOWLEDGEMENTS

We acknowledge the recognition of ZLA by ZERO as a partner in undertaking this important assignment and for providing accurate background and clear guidelines to the exercise. We thank ZLA members that participated in the study and those that provided useful literature and knowledge on the subject matters of the study reported herein.

We are indebted to the organisations that responded to the questionnaires. Their feedback greatly enriched the study. The communities of Kundalumwanshya, Luanshimba and Nambo villages in Chibale Chiefdom of Serenje District in the Central province deserve our appreciation for participating in Group Focus Discussions (GFD) and in administration of household questionnaires.

EXECUTIVE SUMMARY

This report is a presentation of findings from the study undertaken to establish the threat posed by climate change on agricultural productivity and land management. The study further attempts to investigate the link between climate change and land degradation arising from poor agriculture practices and to identify small-scale farmers' adaptation and mitigation efforts. The key outcomes of the study attempt to bridge the knowledge gap between climate change and Land-use systems. The Zambia Land Alliance (ZLA) has been contracted by Zimbabwe Environment Regional Organization (ZERO) of Zimbabwe to undertake the study.

ZLA is a network of NGOs working for just land policies and laws that take into account the interests of the poor. The organization promotes secured access, ownership and control over land through lobbying and advocacy, research and community participation. The formation of the alliance was necessitated by the Zambian Government's land reform process initiated in the early 1990s. Climate change and land management are of key interest to ZLA and its alliance partners.

Zambia like many other countries in Africa is vulnerable to the impacts of climate change, especially in relation to the attainment of sustainable food productivity and food security which is largely based on rain-fed agriculture. Zambia's economic diversification policy is moving from being mining dependent to agricultural based. This shift entails mounting pressure on land utilization for agricultural activities. In the era of climate change the diversification policy will therefore require farmers to apply prudent adaptation and mitigation measures to minimize land degradation and biodiversity losses.

Evidence of the impact of climate change in Zambia is growing. Fluctuations in rainfall pattern and temperature regimes are a case in point. Global warming, caused by accumulation of greenhouse gases such as carbon dioxide is no longer a myth but reality. Zambia has in the recent past seen an increase in frequency and intensity of droughts and floods resulting in huge economic losses especially in the agriculture sector. This has given rise to the need for long-term adaptation measures, especially for small scale farmers. Achieving desired results shall inevitably require strong partnerships among key actors; government, civil society and the international community (cooperating partners). Development and implementation of climate change adaptation and mitigation projects and programmes will need to be well coordinated among the key actors. Notably there are a number of on-going projects supported by government, CSOs and the donor community in forestry and environmental management whose outcomes, lessons and experiences need harnessing and sharing. Also the missing link between climate change and land management and land-use planning and practices will require to be addressed in climate change adaptation and mitigation projects.

In response to climate variability the study has established that some rural and peri-urban communities in Zambia have developed coping mechanisms and strategies to manage calamities brought about by floods or droughts and such mechanisms have in some cases been coined into long term strategies in climate change adaptation and mitigation. Adaptation and mitigation strategies identified include; zero tillage, organic farming, agroforestry, crop rotation and alternative livelihoods. It must be noted that these strategies are also largely land management strategies.

While Zambia is one of the most forested countries in Africa, with about 50 million out of the 75 million hectares total land area under some form of forest cover, the country has also one of the highest rates of deforestation and degradation in the world. It is estimated that the country loses 250,000 - 300,000 hectares of forest per annum and most of it is due to

agricultural activities (largely unsustainable) practiced mainly by small scale farmers. Reversing/slowing down these high deforestation and land degradation trends will therefore require the country to design and implement programs and strategies that will effectively deal with both the proximate and underlying drivers of deforestation and degradation. There is therefore a dire need to link land use and environmental management practices with climate change and adaptation to ensure sustainability in agriculture, land and environmental carrying capacities which ultimately translate into sustainable livelihoods.

Despite there being a good number of institutions and projects supporting small scale farmers in climate change adaptation, there is evidence suggesting that such projects are being implemented without seriously looking at the stress that may be caused on land and vegetation quality. On the other hand, most of environmental management programmes being carried out do not draw direct linkage between climate change adaptation and activities undertaken by small scale farmers. It has also been observed that there isn't much literature available on the direct link between climate change, the environment and Land issues in Zambia. The study establishes the lack of in-depth understanding of how climate change impacts on environment and land management and how they influence agriculture productivity and food security. The study further underscores the policy gaps on the direct linkage that exists between climate change and the inability by relevant policies such as the Land (draft), Agriculture and Environmental Management policies to talk to each other. The absence of a National Policy on Climate Change has also contributed to absence of climate proofed land use practices.

The study presents series of policy recommendations which touch on government support and investment in sustainable land management and land-use practices, provision of information on climate change impacts and adaptation options.

CHAPTER 1: Situation Analysis, the Goal, Objectives and Methodology

1.1 Situational Analysis

Zambia covers 752,614 square kilometres of land and is divided into 10 provinces and 105 districts. The country a has an international boundary of 5,664km and shares borders with eight countries, namely Angola, Botswana, Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania and Zimbabwe. Zambia's international boundary needs regular maintenance to safeguard territorial integrity. There are isolated boundary encroachments in those places where there are no physical marks hence the need to continuously re-define the border to avoid any land related conflicts with her neighbours.

Zambia has two systems of land holding, customary and leasehold tenure. The dual system of landholding has helped to preserve some aspects of cultural practices. But, lack of uniformity in the administration of land has its own challenges. Properties on customary and leasehold tenure do not have similar status in law, which disadvantages customary land holdings. Customary land accounts for 94% of total land size while 6% is under (state) leasehold. Customary land accounts for 60% of the population who are largely small-scale farmers. Customary land suffers from unsustainable natural resources exploitation and land degradation due to absence of effective land-use planning and land management systems. Land administration in Zambia has had many challenges largely due to absence of a functional Land Policy.

Agriculture is significant for Zambia because of the country's large tracts of well-watered land suitable for different kinds of agriculture and animal husbandry. Zambia can also boost its economy and create employment for its growing population of unemployed youths through development of agriculture and food processing industries. Other by industries include suppliers of irrigation equipment, agrochemical suppliers and stock feed, to name a few. Zambian agriculture also presents huge foreign investment opportunities. Zambian investment in agriculture is however largely in Maize production at the expense of other crops such as cassava, rice, pumpkin, cotton, soya beans, potatoes and hay. These crops are offered on wholesale or retail to individuals and companies alike. The seed industry is equally on the growth path. Seed suppliers in Zambia sell crop seeds, fruit and vegetable seeds, and a variety of seedlings for the amateur gardener right up to large farming enterprises. Seed suppliers offer a huge range of seeds from highly developed hybrids to wild species.

Due to the increase in demand for fish and fish proteins, fish farming is growing. Fruit and vegetable production is also on the rise, thanks to increase in outlet supermarket chains and restaurants, lodges and hotels. Livestock processing companies are also growing with the sector.

Small-scale farmers in Zambia dominate the agriculture sector accounting up to 75% of food crops grown. Many also rear livestock, typically chickens, cattle, pigs, goats and sheep. The majority of the farmers use hand tools, while a significant number use animal-powered implements and only a handful have machinery such as tractors.

1.2 The goal of the study

The goal of the study was to assess how small-scale farmers in Zambia have adapted to the impacts of Climate change and what kind of investment they have put on their land as well as

identifying sustainable land-use practices that effectively respond to effects of climate variability.

1.3 Study objectives

i. To assess impacts of climate change on agriculture production in Zambia
ii. To assess adaptation measures undertaken by small-scale farmers to combat climate change effects
iii. To evaluate investments for sustainable land management practices implemented by small scale farmers in a changing climate

1.4 Methodology and Approach

1.4.1 Primary Data collection

The study administered two questionnaires, on institutions promoting sustainable agriculture and climate change adaptation practices to collect primary data to examine existing climate change and environmental management practices. Focus Group Discussions (FGD) and key informant interviews with practitioners and farmers were also applied. Data was collected at two levels namely; institutional and community level. At community level. Data was collected on a wide range of study issues including land size under adaptation systems, type of land-use practices used (crop/livestock) and land management investments.

1.4.2 Desk Review

Desk review involved reviewing available literature on climate change and sustainable land management in Zambia. Specific documents reviewed included research material, field reports and policy documents on climate change and adaptation as well as on environment and land use management in Zambia. The research also made an extensive review of African and regional literature on the impacts, mitigation and adaptation measures of climate change. Reviewed documents included books, journal papers, conference papers, magazine articles, and government & industry reports.

1.4.3 Data Analysis

The primary and secondary data collected was cleaned and analyzed in order to carry out statistical analysis and inferences and make generalizations about climate change scenarios in the future, based on the collected quantifiable findings.

1.4.4 Stakeholder Analysis

The study carried out a stakeholder analysis through identification of NGOs and CBOs working with local communities in mitigating effects and help communities adapt to climate change. This information aims at building a body of climate change actors and provides a resource base for knowledge, lessons and experiences in the environmental sector.

1.4.6 Expected results

The key output from this study is a report on the findings, comprehensively stating the impacts of climate change on agricultural production and identifying adaptation and mitigation measures being practiced by small-scale farmers. And to identify small-scale farmers' investments in adaptation and land management.

1.5. Constraints

The constraints that the research team experienced included:

- The Team had very limited time in which to collect data, process it and prepare the report
- Non responding candidates, some selected institutions failed to provide any response to the research questionnaire.
- The coverage of the research was not wide enough.

CHAPTER 2: Climate Change Impacts on Agricultural Production

2.1 Community feedback

Information from primary data collection tools helped the study team understand better the underlying causes of environmental vulnerability and degradation of communal land. It also underscored perceptions by gender and age groups on climate change and its impact on agriculture.

Table 1: Number of community respondents to household questionnaire

Village	Livelihoods	Respondents	Number of women (F)	Number of men(M)	Number of youths (male and female)
Kundalumwanshya	Farming	women, men, youth	26 F	32 M	15
Luanshimba	Farming	women, men youth	21 F	19 M	12
Nambo	Farming	Women, men Youth	20 F	21 M	10

Respondents generally expressed having heard or learnt about climate change though less clear about the science on causes. Respondents generally referred to decrease in rainfall and high temperatures as the factors that come to mind as felt effects of climate change. This perception is in agreement with information contained in reports generated from studies on weather patterns in Zambia.

Table 2: Community responses on climate change hazards and impacts on farming

Climate Hazard	Drought	Floods	Extreme heat
Impact	• Crop failure as farming is	• Crop damage	• Crop

	largely rain fed • Water scarcity (dwindling surface and ground water reserves) • Increase in human and livestock diseases • Reduced income as vegetable for sale growing is suppressed due to lack of water	• Damage to infrastructure • Increases in human and livestock diseases • Soil erosion • Disruption of human movement • Increase in water borne diseases	failure • Water scarcity • Physical fatigue • Increased human diseases

2.2 Adaption

In view of experienced climate change related challenges the communities in the surveyed areas have developed an array of adaptation mechanisms in relation to agriculture.

Table 3: Coping strategies for climate change impacts among farmers in Serenje

Climate Hazard	**Drought**	**Floods**	**Extreme Heat**
Adaptation Strategies	-Food for work -Practicing agro forestry -Growing early maturing crop varieties - Piece work -Rain water harvesting -Growing drought tolerant crops such as cassava -practice irrigation -Rearing of small livestock (village chickens and goats)	- Collecting wild fruits and tubers - Food for work - Emergency maintenance - Build stronger houses - Fishing - Contour ridging	- Working in early hours of the day

2.3 Land use Management

Gathered knowledge from community feedback indicate significant reduction in traditional shifting cultivation *(Chitemene)* practices hence less new land being opened up for cultivation as communities have learned how to harness soil fertility through such systems as agroforestry and conservation farming as they attempt to adapt to the impact of climate change. It was also learnt that farmers have in recent times gained more understanding of climate change through knowledge they have acquired mainly through interactions with NGOs and media (print and electronic) programmes. Though commercial charcoal production is not a traditionally livelihood practice among the people of Serenje district it was learnt that it was on the rise owing to growing urban market due to energy deficit being experienced in highly populated urban and peri-urban areas.

2.4 Alternative Livelihoods

Increased frequency of crop failure and climate variations and uncertainties has led to communities identifying alternative livelihoods. These include beekeeping, integrated fish farming, and enhanced small livestock production *(local chickens, goats, pigs etc)*. This has had positive impact both in terms of food and income security at household level.

Some respondents spoken to reportedly collectedly during appropriate seasons collected forest non-wood products such as wild fruits, caterpillars, mushrooms etc for sale

CHAPTER 3: Land-Use and Land Management practices Among Small-scale Farmers

3.1 Introduction

Land is the basis of wealth of nations and the platform for the survival of all life forms, human, and other living processes. The way that land is allocated for human and other living (and non-living) resources greatly determines the character, quality of human life and pace of development. In Zambia, the Head of State controls all the land on behalf of the people. However, the State President has delegated land administration functions to the Commissioner of Lands.

Land administration involves the regulation of land ownership, its use and development. In order to regulate land in society, land administration discharges land survey and mapping services to support the registration of land among various users and the valuation of properties for tax purposes. In Zambia, the valuation function is delegated to the Ministry of Local Government and Housing. Similarly, the land use management and planning function is also delegated to the same Ministry (Local Government and Housing). Meanwhile, other specific land use planning and management functions are spread out among different Government departments such as Agriculture - for planning of agricultural land, Wildlife- land use management for preparation of General Management Plans in national parks and Game Management Areas. Other Government departments undertake land use planning in their respective departments such as fisheries, forestry, roads, railways, energy and water. The emerging institutional architecture has a bearing on the efficiency and effectiveness of delivery of land affairs in the country.

Zambia is in the process of formulating a comprehensive national land policy in order to improve on the allocation, use and management of land in the development of the country. It is expected that once the country has a land policy in place there will be improvement in land administration and equity in accessibility to land and resources especially for marginalised groups *(women, persons with disabilities, youth).* It is expected that the new land policy will strengthen land tenure security in order to enhance sustainable and productive management of land resources and provide for a better framework for conservation and protection of ecologically sensitive areas and a cost-effective and efficient settlement of land disputes.

Land use systems among local communities have been largely influenced by traditional practices passed on from generations to generations depending on the region of reference. In traditionally pastoral regions land use practices have largely been divided in cultivation, livestock grazing and settlements. In other parts of Zambia where shifting cultivation is practiced people have temporal agricultural fields though may maintain permanent settlements. Forestry and mineral resource extractions and conservation have significantly altered land use systems in some parts of the country.

3.2 Historical and current trends in agriculture production and land management

Studies have shown that the value of agriculture production in the post 1991 era was prone to fluctuations largely due to extreme weather conditions *(decrease in rainfall).* Some specific examples include country-wide drought in 1992, a partial drought in 1995, and the El Nino phenomenon in 1998. Zambia's agricultural sector is characterized by over 1.1 million small

and medium scale households growing a significant proportion of total agricultural output, around 75% MACO (2008). Between 1990 and 2005, crop output growth was miniscule (1%) and sluggish. The target growth under CAADP was 6% per annum.

Over the past decade, Zambia's agricultural growth has been highly volatile. For instance, in 2005 and 2007, the growth rate was negative. This was attributed to poor rainfall in the preceding two years which in turn depicts the high level of Zambia's dependence on rain-fed agriculture. The positive agricultural growth periods were as a result of four major factors: Favourable weather conditions in most of the major agricultural regions of Zambia; Increased fertilizer use among small-scale producers, primarily due to increased distribution of fertilizer under the government's Farmer Input Support Programme (FISP); increased hybrid seed use.

The only sub-sector that has steadily grown is cassava production. This is attributed to the fact that cassava is less susceptible to climatic fluctuations than other crops such as maize. Cotton and more recently groundnuts have also posted improved performance but below desired targets.

Figure 1: Conservation farming in the wake of reduced rainfall.

Figure 2: Sustainable farming practices through use of organic matter and nitrogen fixing plants are increasing climate resilience, land management and productivity.

Organic manure helps in improving soil viability, quality and its ability to conserve water all that is required in the process of reduction on the dependency of conversional fertilizers. This is in itself is one method of proper land management practice that helps increase resilience among small scale famers

CHAPTER 4: Climate Change Scenarios Going Forward

4.1 Historical trends

The seasonality of rainfall in Zambia is largely controlled by the passage of the tropical rain belt known as the Inter Tropical Conversion Zone (ITCZ) which oscillates between the northern and southern tropics over the course of a year It brings rain between October and April of which in a normal season should range between 150-300mm per month. Variations in the movements of the ITCZ can cause large variations in the rainfall received from one year to the next. The other important factor that influences the rainfall pattern in Zambia is the El Niño Southern Oscillation (ENSO), which is a tele-connection influenced by the warming of the east equatorial pacific waters. This phenomenon (El Niño) brings drier than average conditions in the wet summer months in the southern half of the country, whilst the north of the country simultaneously experiences significantly wetter-than average conditions mainly influenced by the moist north-easterly and north-westerly moist winds.

In recent decades Zambia has experienced increase in intensity and frequency of floods and droughts (GRZ, 2010) Generally, annual rainfall declined across the country between 1940 to 2005. The amount of rainfall and its seasonal characteristics are important factors in Zambia, because its food security and economic growth depend to a larger extent on rain-fed agriculture. Therefore, understanding the historical rainfall patterns and related impacts is useful for national planning, disaster preparedness and resource management. It is also important to understand trends in climatic shocks and related disasters in order to help farmers develop resilient strategies and ensure they invest in climate proof infrastructure.

In recent decades Zambia has seen an increase in intensity and frequency of floods and droughts (GRZ, 2010). Zambia experienced droughts in the seasons 1916/17, 1924/25, 1949/50, 1983/84, 1987/88, 1991/92, 1994/95 and 1997/98, 2001/02 and 2004/05. In the recent past, 2006/07 and 2012/2013 were characterized by widespread flooding causing massive damage to crops, rural infrastructure like roads and bridges as well as houses. Generally, annual rainfall has declined across the country since 1940 to 2005. On average the country received 58 mm (6%) less annual rainfall between 1971 and 2005. In particular; agro-ecological region I (southern parts of Southern & Western Provinces) was drier and more prone to climate change/variability.

Table 4: The table below shows impacts of climate variations in recent years *(source: Zambia Department of Meteorology)*

Season	**Climate related event (s)**
1972/1973	Poorest rainy season in 50 years; drought caused substantial drop in crop yields and a reduction in groundwater reservoirs
1977/1978	Heavy rainfall resulting in urban flooding in Lusaka (Kanyama disaster –extensive infrastructure and settlement damages). This resulted in considerable damage to agricultural crops in many parts of the country.

1978/1979	A drought rainy season, reducing maize production by 25 – 40 percent
1979/1980	A poorly distributed rainy season with elongated dry spells. This caused considerable losses to 1980 maize crop in Southern Province.
1981/1982	Below normal rainfall caused reductions in crop production as well as livestock production. Rainfall deficits ranged from 30 to 50 % in Southern & Western parts of the country and 10 to 40 % elsewhere. The Luano Valley of Central Province experienced significant famine.
1982/1983	Frequent dry spells during the season led to poor performance in the agricultural sector, especially over the southern half of Zambia
1983/1984	Drought reduced agricultural yields for the third consecutive season; worst affected areas were Southern, Central and Western Provinces
1986/1987 .	Frequent dry spells between February and March led to widespread crop failure in Southern Province .
1988/1989	Heavy rains in mid-season caused extensive water logging in crop fields; around Lusaka many people whose houses collapsed were left homeless and lost other household property
1989/1990	Persistent dry spell caused severe moisture stress in the major maize growing areas of Southern, Central and Eastern Provinces
1990/1991	Southern, Central and Lusaka Provinces experienced dry weather conditions. Marketed maize was only 46 % of annual requirement.
1991/1992.	Worst drought for many years hit the most critical crop stage (silk formation). All areas were declared disaster areas by the then Republican President, F.T.J. Chiluba
1999/2000	Heavy rainfall caused floods in many parts of the country. (Season of “Mozambique” Floods).
2005/2006	Heavy rainfall resulted in flash floods especially in the lower Zambezi (Kazungula floods, Kafue Gorge mudslide resulting in country wide power blackout).
2007/2008	Excessive rains over much of the country resulting in flash floods.

4.2 Current and Future Scenario

Zambia is vulnerable to current and future climate change and variability. The country has already recorded increases in temperature and reduced rainfall in the last few decades, with

temperatures estimated to increase at 0.6oC every ten years. The frequency of occurrence of extreme events *(drought, seasonal floods and flush floods, extreme temperatures and dry spells)* along with their intensity and magnitude has also increased, and future scenarios for the period 2010-2070 indicate that temperature will increase further by 2°C and rainfall is projected to decrease by 8-10 percent.

4.3 Projected Changes in Zambia's Precipitation and Temperature Per Agro-Ecological Zone

4.3.1 Precipitation

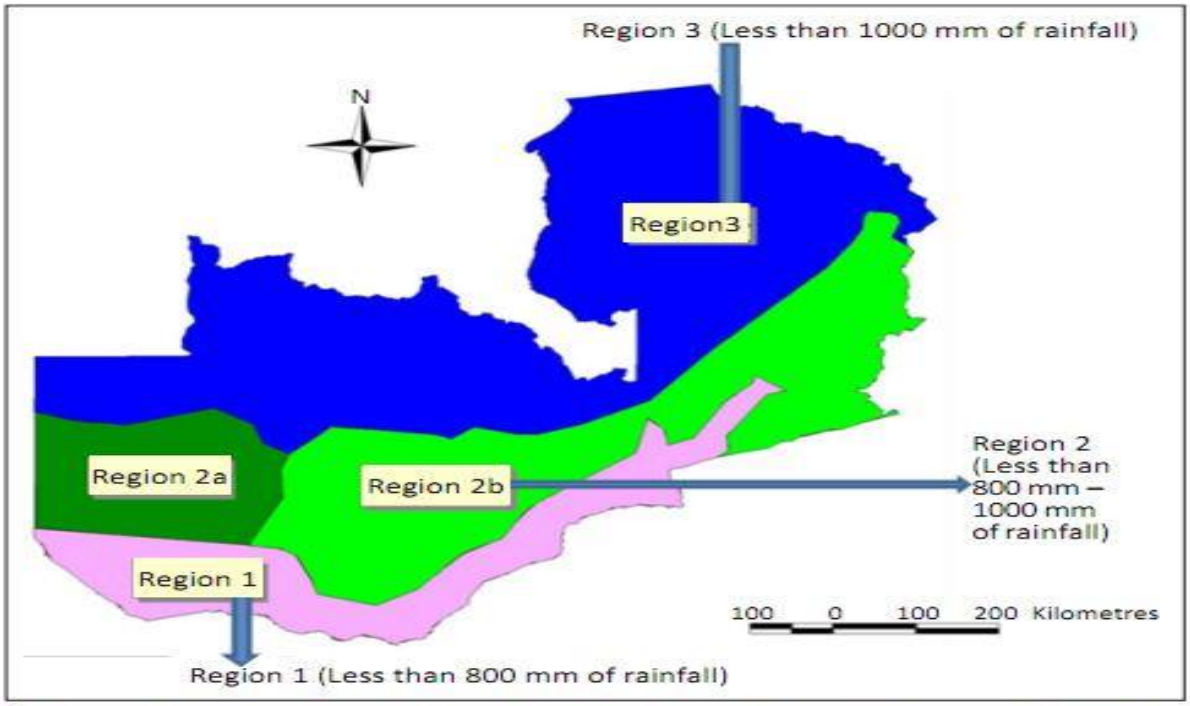
In the year 2007, MTENR working with other cooperating partners and institutions carried out national climatic projections for each of the three agro-ecological zones for a sixty year period from 2010 to 2070.

Zone I: According to the HADCM3 Global Climate Model (GCM) projections done for each zone for a sixty year period from 2010 to 2070 indicates that Zone I monthly totals give a maximum value of 560 mm in 2059, and a minimum value of 105mm in the year 2043. Compared to the baseline, it shows a marginal increase in precipitation for almost all the sixty years with 2059 being very wet. The analysis shows that rainfall in this region is mostly below average, with the driest years being 2014, 2044 and 2065 in that order of increasing magnitude.

Zone II shows most of the monthly totals being below 500 mm, the wettest being the year 2024 with 1200 mm. The comparisons between baseline and projected rainfall again show increase in projected rainfall over the baseline situation. The wettest years are 2024 and 2059, while the driest years are 2065 and 2035.

Zone III: shows a slightly different pattern from the other two. It has years 2024, and 2055 for wettest years with 1100 mm and 900 mm of total monthly rainfall, respectively. The driest years are 2044, and 2063. In comparison to the baseline, the projected rainfall shows a complete increase in almost all the years in some with significant amounts. The indices show a pattern of projected precipitation above average in the sixty years period.

The map below shows Zambia's three Agro-ecological zones



Region I, cover the Zambezi and Luangwa valleys (less than 800 mm); Region II, Covers the central, western and eastern parts of the Country (800 mm – 1000 mm); Region III, covers the northern parts of the country (above 1000 mm).

FIGURE 3: Map of Zambia showing the three agro-ecological zones.

4.3.2 Temperature

The mean temperature scenarios for all the Regions show a similar trend of increasing mean temperatures for the period 2010 to 2070. There is an average increase of about 2ºC (24.5 to 26ºC) for this sixty years period. The years 2013, 2040 and 2062 show the lowest mean temperature in Regions I. Region II has lowest mean temperatures in the years 2013, 2041

4.4 Projected Changes in River Runoff

The expected changes in river runoff will be triggered by mainly two aspects. The decrease in rainfall performance and the increased demand for water for irrigation along the river basins as people increase their agricultural activities.

4.5 Adaptation Measures for Rain-Fed Cropping and Investment Implications

Civil society involvement in climate change adaptation ranged from advocacy to community education and capacity building, supporting project implementation and financing. Climate Change mainstreaming in national development process is another area of CSO interest. Collectively, CSOs are working in nearly all parts of Zambia. Caritas Zambia had a wider coverage among respondents, have presence in about all parts of the country. The majority of organisations have limited coverage ranging for 2 to 5 districts all agro-ecological regions.

CSO investment support is mainly directed at promoting climate proofed infrastructure such as housing and bridges. Other investment areas include climate change adaptation enterprises such as livestock production, moist retention farming practices (eg organic farming) and alternative livelihoods such as beekeeping and fish farming.

Table 5: CSO Interventional Areas

Organization	Primary interest of intervention	Geographical coverage	Duration of the project	Cost of the project (USD)
Eastern and Southern Africa Small Scale farmers	• Finance and capacity building of community scale project • Assessment of climate risk and adaptation • Advocating mainstreaming	Lufwanyama, Chiapa, , Choma, Chama, Mumbwa, Ndola	8 years	2,500
Pelum Zambia	• Supporting policy, planning and information • Financing capacity building of community scale projects	Sinazongwe, Serenje	1 year	50,000
Chalimbana River Head Waters Conservation Trust	• Supporting policy and planning information • Advocating the Mainstreaming of the climate change mitigation and adaption policy formulation	Lusaka, Chongwe	Ongoing	-
Rural Women Assembly of Zambia	• Advocating the Mainstreaming of the climate change mitigation and adaption policy formulation	Mufumbwe, Mumbwa, Rufunsa, Shibuyunji, Chongwe, Choma, Chingola	Ongoing since 2013	12,000
Network for Environmental Concerns and Solutions	• Supporting policy, planning and information • Assessment of climate change risk and adaptation responses • Advocating the mainstreaming of climate change, mitigation and adaptation in policy formulation	Nchelenge	2 years	20,000
Zambia Institute of Environmental Management	• Supporting policy, planning and information • Financing and capacity building of community-based projects • Advocating the mainstreaming of climate change, mitigation and adaptation policy formulation	Luangwa, Solwezi, Kazungula	4 years	100,000
Caritas Zambia	• Supporting policy, planning and information • Financing and capacity building of community-scale projects • Assessment of climate risk and adaptation responses			
Pelum Association	• Supporting policy, planning and information • Financing and capacity building of community-scale projects • Assessment of climate change risk and adaptation responses • Advocating the mainstreaming of climate change, mitigation and adaptation	Sinazongwe	2 years	50,000
Agricultural Consultative Forum	• Supporting policy, planning and information • Financing and capacity building of community-scale projects • Advocating the mainstreaming of climate change, mitigation and adaptation in policy formulation	Mufumbwe	2 years	100,000
Farmers Organisation Support Programme	• Advocating the mainstreaming of climate change and adaptation policy formulation	Mumbwa, Shibuyunji, Chibombo, Chisamba	3 years	268,993
Green Living Movement	• Policy advocacy • Alternative livelihoods • Climate change adaptation and mitigation • Environmental	Serenje, Luanshya, Mumbwa, Monze	15 years	600,000

Table 6: Adaptation and mitigation support and investment

Name of organisation	Areas of support	Number of beneficiary households	Level of success
Caritas Zambia	• Forest conservation • Environmental protection	National wide National wide	Medium Medium
PELUM Association	• Environmental protection	4,200	medium
Zambia Institute of Environmental Management	• Forest conservation • Environmental protection • Water resources management	905 502 1000	High Medium medium
Rural Women Assembly Zambia	• Agriculture • Land reclamation • Forest conservation • Environmental protection	500 500 500 200	Medium Low High High
PELUM Zambia	• Agriculture • Infrastructure • Water resource management	148 178 148	Medium Low Medium
Eastern and Southern Africa Small-scale Farmers Forum	• Agriculture • Biodiversity conservation	2,500 500	Medium Medium
Solution	• Forest conservation • Environmental protection	1,000 1,000	Medium Medium
Farmer Organisation Support Programme	• Agriculture • Improving soil water management technologies	10,000 5,000	Medium Medium
Agriculture Consultative Forum	• Agriculture • Forest conservation	1600 1600	Medium Medium
Green Living Movement	• Sustainable land use practices • Forestry management • Agroecology • Environmental education • Livestock production	8,0000	Medium

4.6 Findings and Conclusions

Policy support and advocacy are key areas of civil society involvement in the climate change discourse in Zambia. Community education and project support also take a reasonable space of civil society climate change engagement. It can be argued that with collective effort Government policies on agriculture, land and environment can be influenced by civil society to address interests of small-scale farmers and marginalised groups going by their level of interest in this area. It is however also true that civil society investment in terms of project financing is low to achieve meaningful results on the ground in terms of implementation of adaptation options. Considering that sustainable livelihoods for small-scale farmers and the poor can only be attained through practicing climate compliant agriculture, sound land

management practices, prudent resource utilisation and conservation of biodiversity, it is imperative that related policies such as the land, agriculture and environmental management policies are not in conflict of each other.

CHAPTER 5: Climate Change Impacts and Adaptation Options for Rain-fed Production

5.1 Introduction

Zambia's agriculture is predominantly rain-fed and irrigation is applied on only 6% of the potential agricultural area. Recurrent droughts and in some instances unusually heavy rains, sometimes result in widespread crop failure and destruction. However, even in the most severe drought years, rainfall is usually sufficient to produce an economic crop of maize if soil moisture retention capacity is normal, the crop is planted in time and short maturing varieties are used. In Zambia recent crop failures have also been attributed to land degradation, poor husbandry practices, and low availability of appropriate seed varieties. There is considerable scope for drought mitigation through the promotion of appropriate agricultural practices

5.2 Methodology: Assessing Climate Impacts on Crop and Rangeland Productivity

This analysis is based on desk review of literature, reports, project documents and studies conducted in Zambia by different individuals and institutions. Some data was derived from interactions and interviews with stakeholders and the expertise and knowledge of the authors. Focused Group Discussions were held at community level while household and institutional questionnaires were administered to generate information at household and institutional levels.

5.3 Impacts of Climate Variability and Climate Change on Crop Production

The biggest impact experienced by farmers with regard to climate change has been declining crop yields, especially maize crop, Zambia's stable food. Communities in regions most affected by climate change have been experiencing a steady decline in crop yields in the past ten years mostly attributed to prolonged dry spells, droughts or floods. Some regions that have had the worst experience have recorded as high as 80% decline in crop yields in just the past ten years. In communities that have been dependent on government support for subsidized farm input under the Farmer Input Support Programme (FISP), farmers have had the dilemma of having to choose what was provided under the package (FISP) and what was appropriate but not available. Failure to secure appropriate seeds has resulted in reduced income and household food deficit.

Although climate change manifests in different forms other than just precipitation levels and frequency the study revealed that other climate change attributes such as variations in temperatures did not have as much impact as rain with regard to crop production. Variations in average temperatures were said to have an effect on the storage of harvested crops although this was said not to impact so much on people's livelihoods.

5.4 Impacts of Climate Change/Variability on Rangeland and Livestock Productivity

Climate Change has also had its toll on rangeland and livestock productivity. In pastoral communities farmers have had to cover long distances to find quality grass to graze their animals and as such it has had an effect on the quality of the animals and ultimately this has

had an effect on their income. Reports indicated that under normal circumstances *(when the rainfall patterns were normal)* animals only spent about 10% of their grazing time looking for suitable grazing grounds and spent the remaining 90% grazing but currently with the changed climatic conditions animals were said to be spending over 50% of their grazing time looking for suitable grazing grounds. As such they expended more of their weight searching for grass than they gained after grazing. This reduces the live-weight value of an animal thus depriving the farmers of their income. The farmers also raised concerns over the amount of time they have to spend looking for pasture for livestock. Which is the time they would otherwise use on other demands on their farms? This entails that productive time is spent on taking care of the animals at the expense of other income generating activities and adequately fending for their families.

One main feature in areas prone to drought has been the drying up of rivers and streams. Rivers and streams are the main sources of water for livestock and in some communities even for domestic and human consumption. Dried rivers deprive both humans and the animals the needed water in quality and quantity and that has an adverse effect on the quality of life for the farmers and their livestock. Particularly this has been a major source of concern in agro-ecological zone 1 (southern part of the country) where most of the streams around villages dry up barely two months after the offset of the rainy season. One woman in Monze (zone 1) explained;

"Grazing grass for animals has seriously been affected by inadequate rains, so there is little grass for animals to graze on and the quality of the grass is also poor. The quality of the animals is just as poor and the market value for the animals has significantly gone down"

However these effects on livestock were not as prominent in zones 2 and 3 (central and northern part of the country) as only a few rivers dried up immediately after the rainy season.

5.5 Summary and Policy Implications

Climate Change has emerged as one of the main problems faced by farmers today. It may manifest in different forms but its effects continue to negatively affect farmers, especially small-scale farmers whose productivity is largely at the mercy of climate variability. Continued crop failure and declining livestock quality all translate in monetary loss for farmers and reduction in their quality of life. Ultimately as these effects increase in frequency and productivity dwindles, the GDP will slump. Likelihood is that the strategic national food reserves will decline, thereby creating a situation for food imports which may reduce the country's foreign exchange reserves and slow down economic growth.

A key Policy measure is to strengthen national early warning systems and emergency preparedness and timely information collection and dissemination among the farming community. This could reduce the effects of unstable weather conditions as farmers will make timely and informed decisions. It is also important that community education on climate change, its causes and impacts and adaptation options are defined in the same manner in related national policies, particularly the Land, Agriculture and Environmental Management policies.

CHAPTER 6: National Agriculture Policy - Overview

6.1 Introduction

It is estimated that more than 47% of Zambia's arable land remains untapped and 60% of SADC fresh water is in Zambia (Zambia National Agriculture Investment Plan 2014-2018 under the Comprehensive Africa Agriculture development Programme CAADP). Only 15% of Potential arable land is under cultivation (BOZ, 2003). Due to her strategic location as a land locked country to other countries in the southern African Sub-region, she has the potential to feed its 15 million consumers including the 250 million consumers within the SADC region. It's no doubt that Agriculture is the major employer in Zambia. According to NKW Zambia website, "Primary agriculture amounts to about 35 percent of the country's total non-traditional exports (all the country's exports, other than copper and cobalt) and to about ten percent of the total export earnings for the country. The sector also provides employment to 70 percent of the national labour force while contributing 19.8% of the GDP. The open door agriculture policy has in the last decade seen an increase inflow of foreign farmers mainly from Zimbabwe and South Africa investing in agriculture.

The National Agricultural Policy (NAP), 2004 – 2015, whose vision is "to promote…development of an efficient, competitive and sustainable agricultural sector which assures food security and income" was developed on the premise of stimulating small-scale productivity through increased private sector participation in agriculture marketing, in-put supply, credit services and processing. The five policy objectives were;

- To assure national and household food security
- To ensure that the existing agricultural resource base is maintained and improved upon
- To generate income and employment to maximum feasible levels
- To contribute to sustainable industrial development
- To expand significantly the sector's contribution to the national balance of payments

The NAP outlined 19 policy strategies to achieve the stated objectives. Three of the strategies relevant to the study are; (i) facilitating availability of and accessibility to land for agriculture and development of infrastructure in potentially productive agricultural areas, (ii) promotion of sustainable and environmentally sound agricultural practices and maintaining agro-biodiversity and (iii) promoting conservation of aquatic eco-system and sustainable utilisation of natural resources.

The policy tend to advance a belief that increase in productivity will come from expansion of area under cultivation, expansion of irrigable land and improved research and extension linkages. As has been found out by this study, however expansion of land under cultivation requires considerable consideration of climate change and land degradation effects. The policy though recognises increase in use of better and sustainable farming practices such as conservation farming, crop rotation and low input agriculture.

The implementation of the NAP strategies was expected to result in attainment of food security for the majority of rural farmers and contributing to between 10 and 20% of total foreign exchange earnings while raising its contribution to GDP to over 30% from 18 – 20% (2004). The agriculture sector was expected to grow between 7 – 10% per annum from 2005 onwards.

6.2 Shortcomings in the Agriculture Sector

Sadly the agricultural sector has not lived up to policy pronouncements. Some of the key shortcomings identified by the study are stated below;

- Agriculture has largely been driven by maize cultivation which has been over-supported
- Generally, maize is being grown at a great cost because it is being grown even in areas without any comparative advantage for its cultivation
- Despite Zambia having one of the most favourable climate in Africa and being richly blessed with abundant natural resources, water inclusive and the policy placing emphasis on irrigation, this potential has not been fully utilised and the majority of the small-scale farmers are still highly dependent on rain-fed agriculture.
- The agriculture sector has failed to attain the 7 – 10% growth envisaged by the NAP
- The national budgetary allocation to agriculture has remained below 10% since 2004 when the NAP came into effect
- The NAP does not explicitly recognise sound land management as an agricultural sustainability measure
- Zambia's agriculture policy does not recognise climate change as an agricultural and land-use issue

- Zambia remains an importing nation not only of agricultural machinery but also food products, this shrinks market accessibility especially for small-scale farmers
- Small-scale farmers do not have access to agriculture financing
- Most small-scale farmers do not have adequate capital to acquire necessary agriculture equipment especially for irrigation, a situation which perpetually consign them to dependent on rain-fed agriculture

CHAPTER 7: Recommendations

On the basis of the findings of this study the following recommendations are drawn;

- Review the strategies and approach as well as type of activities being supported in order to achieve high level of success.
- The need for all stakeholders proving support to climate change and adaptation and sustainable land management to intensity their effort in lobbying government to finalise the draft land policy to ensure land administration is linked to climate change adaptation practices.
- In view of scarcity of water during drought years, there need to support rain water harvesting for human and livestock consumption as well for irrigation of vegetables
- The high level success achieved in forest sector should inspire stakeholders providing this support to scale up the area of coverage and involve more beneficiaries.
- There is need to invest more in infrastructure development which one of the key areas in climate change resilience.
- In the areas of agricultural production, there is need to redefine the activities being supported in view the current on monoculture and crop production.
- To sustain household food security all year round, there is need to support value addition and growing of high value crops.
- Stakeholders should lobby government to synergise the climate change policy with land policy to ensure that climate change adaptation practices are in tandem with sustainable land use.
- The need to have stakeholder matrix which will help to enhance collaboration and coordination in areas of climate change adaptation and sustainable land use.
- It is recommended that areas of water resource management should be refocused to respond to the issues of climate change adaptation and sustainable land use.

References

Green Living Movement (2014), *Site specific evidence of climate change and variability in Kafubu, Project report on Community Strategies for Climate Resilient Livelihoods Project*

Hachileka. E and Vaatainen. S, (2010), *Climate Change Adaptation Strategies in Chiawa Community in Lower Zambezi: Report for the IUCN Project*

Ministry of Lands, Natural Resources and Environmental Protection (2015), *Draft national land policy*

Ministry of Lands, Natural Resources and Environmental Protection (2015), Z*ambia national strategy to reduce emissions from deforestation and forest degradation (REDD+),*

Ministry of Tourism, Environmental and Natural Resources (2007), *National Adaptation Programme of Action* (NAPA)

Mulenga, S. (2010), *Climate Change in Zambia: opportunities for Adaptation and Mitigation through Africa Biocarbon Initiative*

The Bestofzambia.com/industry/food-and-agriculture/

Muyawa, J, (2012), *Zambia Agricultural Policy Analysis*

Ministry of Agriculture and Cooperatives (2004), *National Agriculture Policy (2004 – 2015)*

United States Agency for International Development (USAID 2014), *FEWS NET.*

ANNEX 1: INSTITUTIONAL QUESTIONNAIRE

1.0 ***General Information***

*Name of the organization*_____

1.1 Current Professional Affiliation

Local/community NGO
International NGO
Research institution
Bilateral donor
University
Government
Multilateral bank/donor
United Nations agency
Private sector
Other (please specify)

1.2 **What are your primary interests related to climate change adaptation?**

(a) supporting policy, planning and information including the integration of climate change risks across themes
(b) Financing and capacity building of Community-scale project
(c) Assessment of climate change risks and adaptation responses, or establishment of national adaptation
(d) Advocacy: mainstreaming climate change, mitigation and adaptation in policy formulation and legal frameworks

(e) Other (please specify)

1.3 Which geographical region have you targeted (District) _____

1.4 For how long has your project been running? _____

1.5 What is the total cost of the project (USD) _____

1.6 When is the project expected to end?
households_____
1.7 Does your targeting taking into account of gender dimension (1 = Yes 2 = No)
1.8 If Yes in 1.6, explain how this gender consideration is
applied_____-____

2. **Area of intervention in climate change adaptation**

Indicate area of engagement in climate change adaptation and number of beneficiaries

Area of Engagement	Number of beneficiary	Level of success 1 = high. 2 = medium, 3 = low
2.1 Agriculture		

2.1 Infrastructure development		
2.3 Land reclamation		
2.4 Forest conservation		
2.5 Environmental protection		
2.6 Water resources management		
Other (specify)		

3. Land Use in targeted geographical areas

In terms of land utilization in targeted geographical of areas, indicate roughly the status of land use before the implementation of your project and how the land use has changed during the course of your intervention and also how the scenario is likely to change in future. Also provide comments especially as regards to the cause of the trend.

Land Use Type (LUT)				
3.0 Land Use	Area % before intervention	Area % After Intervention	Area % projection	Comments
3.1 Crop land total				
3.1.1 Under Rain-fed				
3.1.2 *Under Irrigation*				
3.2 Grazing land				
3.3 Forest/woodlands				
3.4 Protected forest				

4. Adaptation strategies.

4.1 Give a brief account of the adaptation strategies in different areas of intervention.

4.2 What synergies are with other areas of intervention that ensures that climate change adaptation practices are in harmony with sustainable land use?

4.3 What gaps do you see in the linkage between climate change adaptation practices and land use practices?

5.0 Challenges.

5.1 List and Explain the challenges faced during the implementation of climate change adaptation project by your organization

5.2 List and explain challenges faced by small scale farmers in the implementation of climate change adaptation activities.

Climate Change Assessment
(Household Questionnaire)

1.0 Background information

Date of Interview: ...../……./2016

Village/Community name _____ District: _____

Name of Respondent _____ Age_____ Sex _____

2.0 Climate change Knowledge

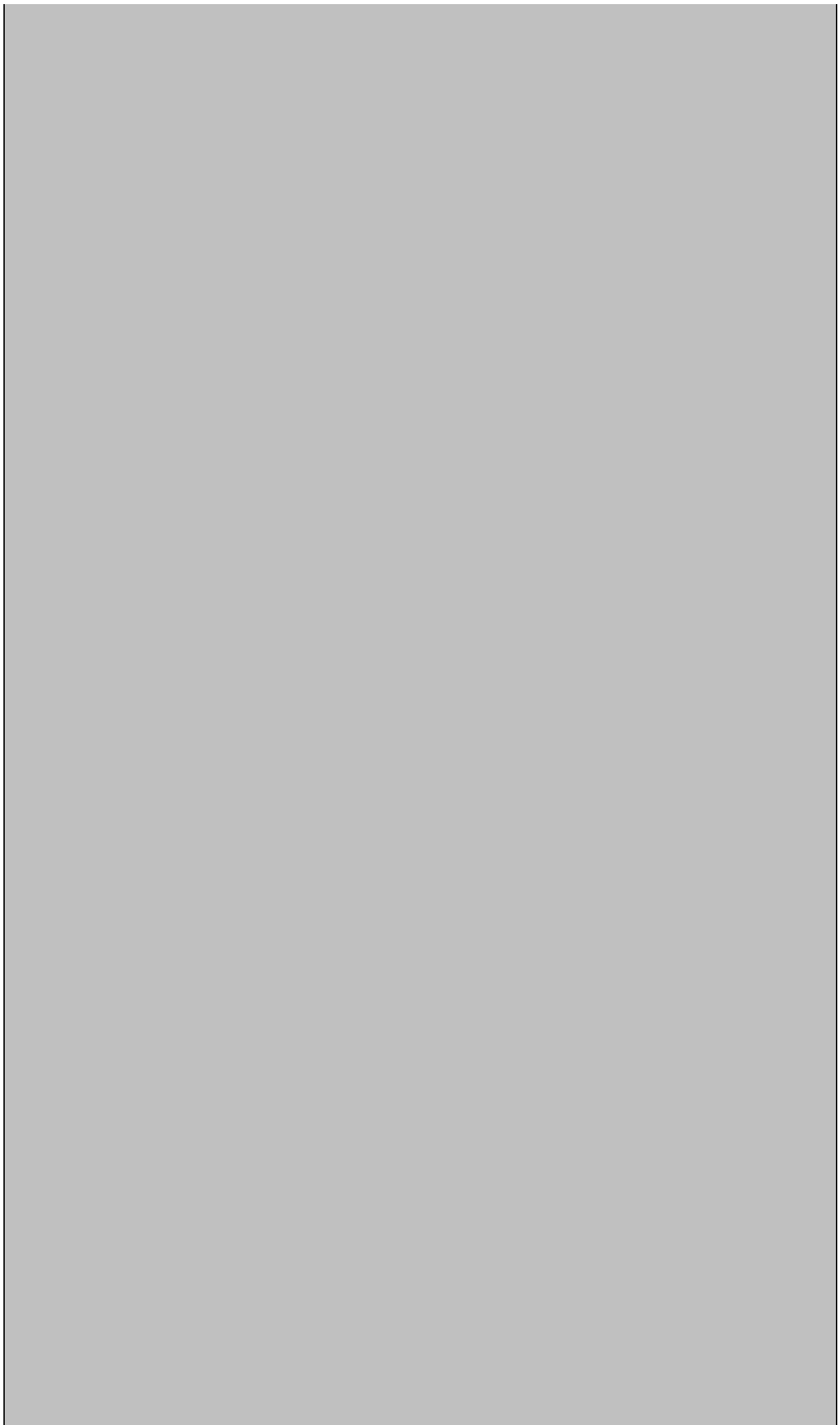
2.1	Do you know anything about climate change 1= Yes, 2 = No	
2.2	If your answer in 2.1 is yes, how did you come to know about climate change (a) Through indigenous knowledge (b) heard from science experts (c) through the radio/Tv (d) through training workshop (d) other.....(specify)	
2.3	Comparing the 1990s with the past 10 years i.e. 2000s, have you noticed any changes in the rainfall patterns? 1= Yes 2 = No	
2.4	If yes, what type of change have you notices (a) Increase (b) decrease	
2.5	Comparing the 1990s with the past 10 years i.e. 2000s, have you noticed any changes in the temperature patterns? 1= Yes 2 = No	
2.6	If yes, what type of change have you notices (a) Increase (b) decrease	
2.7		

Mention at
your agricu

(a) ____

(b) ____

____



(c)

2.0 Climate change Knowledge		
2.1	Do you know anything about climate change 1= Yes, 2 = No	
2.2	If your answer in 2.1 is yes, how did you come to know about climate change (a) Through indigenous knowledge (b) heard from science experts (c) through the radio/Tv (d) through training workshop (d) other.....(specify)	
2.3	Comparing the 1990s with the past 10 years i.e. 2000s, have you noticed any changes in the rainfall patterns? 1= Yes 2 = No	
2.4	If yes, what type of change have you notices (a) Increase (b) decrease	
2.5	Comparing the 1990s with the past 10 years i.e. 2000s, have you noticed any changes in the temperature patterns? 1= Yes 2 = No	
2.6	If yes, what type of change have you notices (a) Increase (b) decrease	
2.7		

Mention at
your agricu

(a) ____

(b) ____

____

(c) ____

2.8	Mention three ways in which climate change has affected your sources of income (a) _____ (b) _____ (c) _____	
2.9	What are the three main climate change adaption practices in relation to crop production? 1. Growing drought tolerant crops 2. Conservation farming practices 3. Crop rotation 4. Income diversification 5. Irrigation with rain in harvested water 6. Other (specify)	
2.1	Mention three adaptation measures you have put in place to counter the impact of climate change on income sources (a) _____ (b) _____ (c)_____	
3	**Source of information**	
3.1	Are you receiving any technical or financial support in the implementation of climate change adaptation activities? 1 = Yes 2 = No	
3.2	If the answer to question 3.1 is yes, name the type of support _____	
3.3	Which organization providing the support? _____	

3.4	Are you able to continue with the practices after this support is discontinued? 1 = Yes 2 = No	
3.5	To what level are these adaptation activities meeting your expectations - high (b) medium (c) low	
4.0 Land use Practices		
4.1	Do you own land? 1 = Yes 2 = No	
4.2	If in question 4.1 the answer is yes, indicate the amount of land you own going by the following categories - < 1 hectare (b) 1-2 hectares (c) 3-5 hectares (c) 6-8 hectares (d) 9-10 hectares (e) > 10 hectares • Other (specify)	
4.3	Indicate the percentage of land use as follows: • Upland crop production • Vegetable production • Grazing • Forested • Other (specify) _____	
4.4	Are you practicing sustainable land use? 1= Yes 2 No	
4.5	If the answer to 4.4 is yes, in which of your practices are related to sustainable land use? (α) _____ (β) _____ *(χ)* _____	
4.6	Has climate change had any influence on your land use practices?	

4.7	If the answer in 4.6 is yes, can you indicate the type of influence that this has had. **a.** Relocation from upland to low land cultivation **b**. Open more land and increase the type of crops grown to spread the risk c. Resorting to zero tillage cultivation d. Allocation of more land for pasture e. Allocating less land for pasture f. Reserving more land forested g. Practicing agroforestry (i) Other (specify)	
5.0 Impact of Climate change on the environment		
5.1	Do you think climate change has impacted negatively on the local natural resources? 1 = Yes 2 = No	
5.2	If the answer is yes to question 5.1, can you mention some of the impacts you have observed? (a).Drying up streams due to low rainfall (b). Degraded land due to increased forestry exploitation (c). Reduced grazing area. (d). Land degradation due to erosion as a result of reduced vegetation cover. (e). Other (specify)	