

**ENVIRONMENTAL LEARNING FOR COPING WITH DROUGHT AMONG  
SMALL SCALE FARMERS OF LUANGWA DISTRICT, ZAMBIA**

BY  
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OF DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL EDUCATION**

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## DECLARATION

I, **Chipatu Lillian**, declare that this thesis represents my own work and has not been previously submitted for a degree at the University of Zambia or any other University and that it does not incorporate any published work or material from another University.

Name: Chipatu Lillian.

Signed \_\_\_\_\_ 

Date \_\_\_\_\_

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## APPROVAL

This thesis by **Chipatu Lillian** is approved as fulfilling the requirements for the award of the degree of Doctor of Philosophy in Environmental Education by the University of Zambia.

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\_\_\_\_\_ Date \_\_\_\_\_

## ABSTRACT

Luangwa District in Zambia's Lusaka province lies within a marginal area that is prone to both drought and floods in the rainy season (Luangwa District Council, 2007). Despite small scale farmers of Luangwa District employing various drought coping strategies, drought and floods continue to adversely affect them in terms of food security and the general livelihood of the population (Kaminsa, 2008). Although environmental learning for coping with drought among small scale farmers has not been studied or explored, some scholars have explained the role that environmental learning plays in coping with environmental hazards (Goulder, 1999; Holdren, 1990). The aim of the study was to examine environmental learning of coping with drought among small scale farmers of Zambia's Luangwa District so as to determine its appropriateness.

To achieve this aim, the study established drought coping strategies among small scale farmers of Zambia's Luangwa district. Having done this, an examination of environmental learning related to such drought coping strategies was done.

The study was a critical realist case study within a setting of qualitative methodologies. A semi structured interview guide was used on disaster management officers, agriculture supervisor, town planner and extension officer, while a focus group discussion was conducted among the small scale farmers. Observations of farming activities on small holdings were also done.

The study established that small scale farmers of Luangwa District mainly employed traditional drought coping strategies. Furthermore, the study findings revealed that environmental learning among small scale farmers was on general farming practices and not specifically on drought coping. Thus the study findings confirmed literature assertion that there was superficial environmental learning among small scale farmers.

Finally, the study comes up with a proposed environmental learning programme for drought coping which may potentially be useful in addressing drought coping challenges among the small scale farmers of Luangwa District. Thus a major recommendation is for the Ministry of Agriculture and other stakeholders to introduce environmental learning for drought coping among small scale farmers. Further, the government of the republic of Zambia needs to allocate more funds to extension service.

## **DEDICATION**

To my late grandmother Jennipher Mambwe Mutengo, my mother Beatrice Mambwe and my sisters Lombe, Barbra, Suwilanji, Marrian, Mutale and my niece Lukwesa for their encouragement and moral support.

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## LIST OF ACRONYMS

CARE	Co-operation America Relief Everywhere
CFPC	California Forest Pest Council
DPPC	Disaster Prevention and Preparedness Commission
FAO	Food and Agriculture Organisation
GAP	Global Action Plan
GRZ	Government of the Republic of Zambia
JAICAF	Japanese Association for International Collaboration of Agriculture and Forestry
MACO	Ministry of Agriculture and Cooperatives
MOE	Ministry of Education
PAM	Programme Against Malnutrition
REEP	Regional Environmental Education Programme
SADC	Southern Africa Development Community
SWEDES	Swedish International Centre for Education for Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNISDR	United Nations International Strategy for Disaster Reduction
WFP	World food programme
ZVAC	Zambia Vulnerability Assessment Committee



## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Introduction**

This chapter presents the background that generated the need to conduct this study, whose orientation was on developing an Environmental Learning Programme to address drought coping challenges among small scale farmers of Luangwa District. A focus on environmental learning in addressing drought challenges was deliberate because environmental learning of drought coping has a capacity to guide appropriate action for drought coping.

The study was tailored to bring to light how Environmental learning could be useful in empowering small scale farmers of Luangwa District with knowledge and competences for drought coping. In contributing towards the fulfilment of this focus, this chapter has also provided the background to the research, statement of the problem, research questions, research objectives, significance of the study, the outlined structure of the whole thesis and ends by giving its brief summary.

#### **1.1 Background**

Drought represents one of the most reoccurring hazards that have resulted into starvation and famine in many parts of the world (Haile, 2005). At the time of conducting this study in the year 2016, many countries in Southern Africa (i.e. Zimbabwe, Malawi, Botswana, Swaziland and Namibia were also experiencing drought). In 1960, about 18.5 million people were affected by drought worldwide and by the 1970s, this figure rose to 24.4 million (Swedish Red Cross Statistics, 1984). In view of its frequency, severity and duration, there has been a remarkable increase in impacts associated with drought in both developing and developed countries (Pulwarty, Donald, Mannava, 2014). Consequently, farmers have come up with various ways of coping with drought.

In Africa and most importantly Sub Saharan Africa, small scale farmers depend on rain fed agriculture for their livelihoods and are often victims of climatic variability (Adger, Huq Brown, Conway and Hulme, 2003; Yamin, Rahman, Huq 2005; Vogel, 2005). Small scale farmers thus engage in different drought coping strategies such as

selling of farm produce, practicing reduced consumption, using drought tolerant crops, defaulting on loans, withdrawing children from school and liquidation of productive assets such as livestock, land, trees and other assets (Shiferaw, Tesfaye, Kassie, Abate, Prasannac, and Menkird, 2014). In this study, drought coping *are those actions undertaken after a drought episode* (Blaikie, Cannon, Davis and Wisner 1994) and drought coping strategies are *small scale farmers's activities whose main purpose is to meet their needs under conditions of extreme food insecurity*. Even with these numerous coping strategies, drought continues to ravage lives of farmers in Sub Sahara Africa. The United Nations Development Programme (UNDP) (2011) is of the view that even if drought continues to be a menace in Sub Sahara Africa, a rich collection of knowledge base resources for drought risk management exists in Sub Sahara Africa but remains unrealised partly due to formalised institutions to promote exchange across regions.

One of the Sub Saharan African countries that has been affected by reoccurring drought is Zambia. Zambia has historically been affected by drought and flooding, although the frequency, intensity and geographic distribution of such incidents have increased over the past two decades (Kalinda, 2014; Lekprichakul, 2006; UNDP, 2010). Climate change projections in Zambia show an increase in temperature and a change in rainfall patterns, leading to prolonged drought and localized flooding (Bwalya 2010). As a result, Zambia experiences more strong water dearth at critical periods of the farming season, resulting in severe decreases in crop yields. It is worth to note that agriculture is an important sector in Zambia and that 75 percent of the population directly or indirectly depends on the agriculture sector (Food and Agriculture Organisation (FAO) / World food programme (WFP), 2005). Further, the vast majority of farmers are heavily dependent on rain fed farming (Kassie, Olaf, Maleni, Gwara, and Abate, 2013). Thus, persistent occurrences of droughts entail serious risk for the livelihood of rain-fed agriculturalists. Agricultural system has a twofold sub-sectors; a mixture of small scale to very large scale corporate farmers. While 85 percent of the total farming households hold less than 5 hectares of land and use simple and somewhat less advanced production technology, about 10 percent of them cultivate 20-150 hectares of land and use mechanized farming techniques (Sakurai, Umetsu and Lekprichakul, 2004). Out of the total number of farmers, 79%

of the Zambian farming communities are small-scale farmers and are largely depend on maize production for their survival (Japanese Association for International Collaboration of Agriculture and Forestry (JAICAF), 2008). In this study, *small scale farmers are farmers who own 5ha of farming land.*

During drought and dry spells, most small scale farmers in Zambia use various coping strategies such as, wild fruits gathering, gardening, and off-farm activities like craft making. However, gardening as a coping strategy is ineffective to sustain these farmers mainly because crops grown in these gardens are not enough to sustain the farmers up to the next harvest season (Mubanga, 2014). Others sell animals and use that money to buy food stuffs, reducing intake of food and cutting trees for charcoal production (Kalinda, 2014). In Chiawa area along the Zambezi River, river bank cultivation is practiced (Lupele, 2002).

One of the Districts in Zambia that is constantly hit by drought is Luangwa (Kaminsa, 2008). Luangwa District in Lusaka province lies within a marginal area that is prone to both drought and floods in the rainy season (Luangwa District Council, 2007). The rainy season is short, causing the area to be highly prone to serious drought spells. On the other hand, the area is prone to flooding when the Luangwa River bursts its banks. The District is also part of a National Park and Game Management Area (GMA) and has a variety of animal herds that include a variety of bird species (Kaminsa, 2008). The District therefore, forms part of the animal corridor for the GMA. People living near such areas are vulnerable to attacks from animals and infestations on their crops.

Despite employing varieties of drought coping strategies, droughts and floods continue to adversely affect the people of Luangwa District in terms of food security and the general livelihood of the population of Luangwa. Some drought relief support from the government and other organisations have been of good help though it is not a permanent solution and hence it is a common scenario for small scale farmers to call for help from the government each time they are in need of relief food (Luangwa District Council, 2007; Kaminsa, 2008). Carter, Little, Morgues and Negatu (2006) noted that relief support from government and other organisations are unsustainable and a perfect vehicle for poverty perpetuity among the small scale farmers. They argued that this makes small-scale farmers dependant on relief support.

Studies on drought have ruminated on drought perception, drought mitigation, drought resistant crops and identifying drought coping strategies (Michelo, 2000; Haggblade 2006; Mubanga, 2014; Kalindi, 2014). Further, some of the empirical studies on environmental learning include Lundholm, Rickinson and Hopwood (2009) environmental learning: Insights from research experience and Mallen and Barraz (2007)'s 'environmental learning in adolescents from a Mexican community involved in forestry. Few studies have been mused on environmental learning relating to drought coping. Although environmental learning pertaining to drought coping has not been examined, it enhances environmental knowledge which is key in making important decisions concerning environmental issues such as drought. Environmental knowledge could play a vital role in helping small scale farmers leave in harmony with nature, develop more environmentally benign strategies and consequently be able to efficiently cope with environmental hazards like drought (Holdren, 1990; Kane, 1996; Goulder, 1999; Pandey, 2009). This researcher contends that environmental learning for drought coping is cardinal in behavioural and social change on coping. Environmental learning of drought coping may thus guide small scale farmers in taking appropriate action for drought coping.

Environmental learning entails learning about the environment, in the environment and for the environment (Le Grange and Reddy, 2007). Learning about the environment opens up the opportunity for understanding drought, causes, and impacts of drought and unlearn misconceptions. Learning in the environment uncovers the prospects of learning in different contexts: in formal school setting, local communities and more or less natural setting with a shift away from textbook - based learning to experiential learning (Le Grange and Reddy, 2007). In addition, learning for the environment opens up opportunities for small scale farmers to come up with appropriate and effective long lasting (sustainable) drought coping strategies. This aspect is dealt with in more detail under section 2.2.6 of this study.

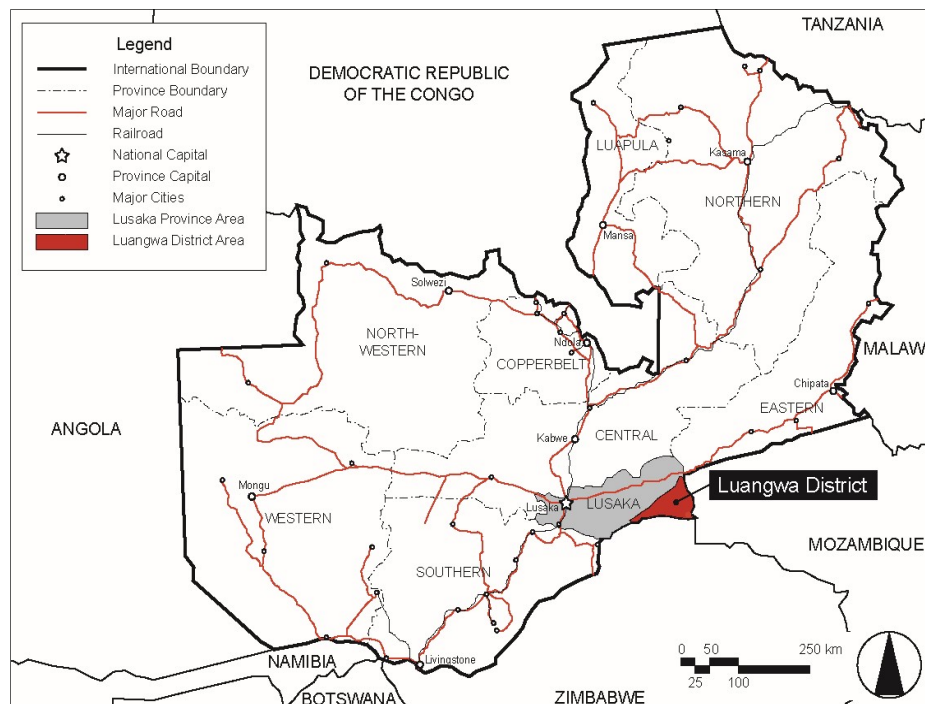
### **1.1.1 Description of the Study Area**

This part of the background gives a description of the study area in terms of geographical location, climate and topography. It also justifies the choice of the study area.

### 1.1.1.2 Location of Luangwa District

Luangwa District, formerly known as Feira is on the periphery of Lusaka Province. The district covers an area of about 3,886 square kilometres (Luangwa District Situation Analysis Report, 2008). The District centre is approximately 350 km from Lusaka and is located at the confluence of the Luangwa and Zambezi Rivers. Luangwa District borders with Chongwe District in the north, Kafue District in the west as well as Mozambique and Zimbabwe in the east and south respectively (Kamisa, 2008). Most of the district is covered by the Lower Zambezi National Park (LZNP) and Rufunsa Game Management Area (GMA). Figure 1.1 shows the location of Luangwa District in Zambia.

*Figure 1.1: Location of Luangwa District*



*((PPH, GIS Database, 2010)*

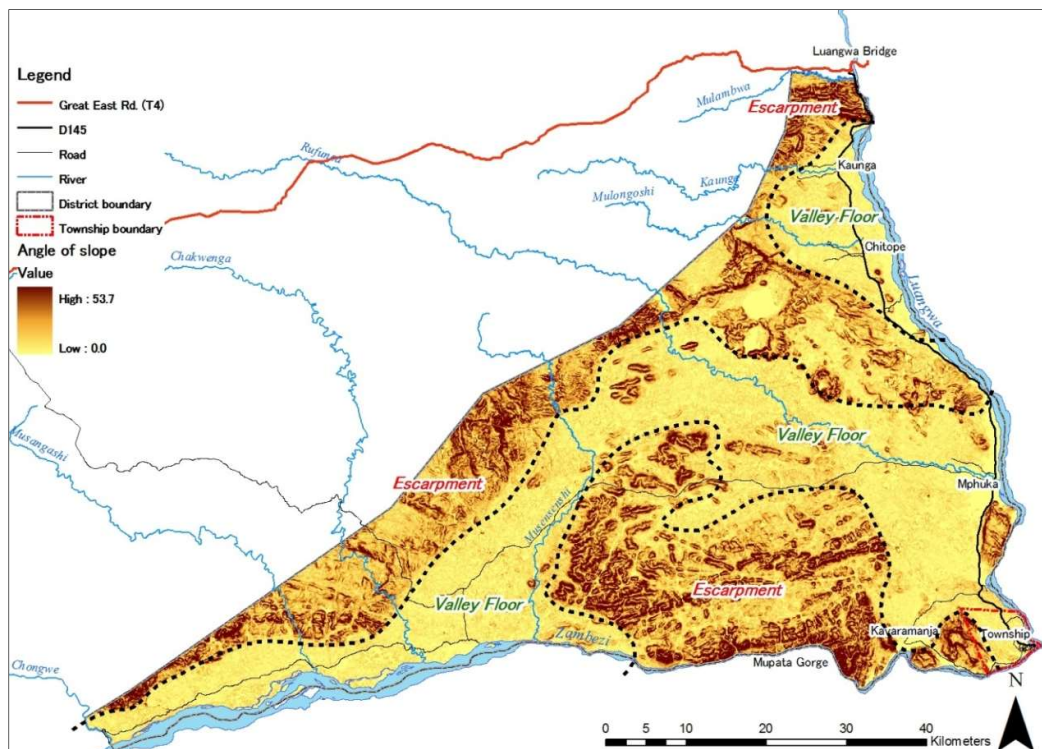
### 1.1.1.3 Topography of Luangwa District

Luangwa's topographical features are mainly valleys and escarpments. The escarpment stretches from Mupata Gorge, succeeding the border from Luangwa Bridge to Chongwe River and expands to the north toward Chongwe District. It is composed of rugged landscape with deeply dichotomized massive ridges of various heights, ranging on average from 750 m to 1,400 m above sea level (Luangwa

Integrated Development Plan Report, 2010). The highest altitude in the district is 1,420 m at one of the break points on the border between Luangwa Bridge and Chongwe River near Musensenshi River. The escarpment forms a complex divide of drainage systems flowing both east-west and north-south.

Most of the eastern part of the District is composed of the lower Zambezi and Luangwa Valleys at an altitude ranging from 600 to 800 m (Luangwa Intergrated Development Plan Report, 2010). It is characterised by terraces of alluvial deposition. The valley floor is a suitable area for development with regard to the topographical conditions. Most of the population has thus been concentrated on the east side of the valley along the Luangwa River under the Rufunsa Game Management Area (GMA) and the rest of the valley floor has been used as a core area of the Lower Zambezi National Park (LZNP) for tourism. The elevation however ranges from an altitude of about 330 m to 630 m and generally goes up toward the west side of the area as shown in figure 1.2. The lowest point is about 325 m in the vicinity of the confluence and the highest point is about 630 m halfway up the Chirombwe Hill (Luangwa District Situation Analysis, 2008).

**Figure 1.2: Topographic Features of Luangwa District**



*(PPH, GIS Database, 2010)*

While there are other small rivers, Luangwa's two major drainage systems are the Zambezi and the Luangwa Rivers. Other smaller drainage systems include the Mulambwa, Kaunga, Mulangoshi, Rufunsa, Musensensi, Chakwenga, Musangashi and Chongwe rivers.

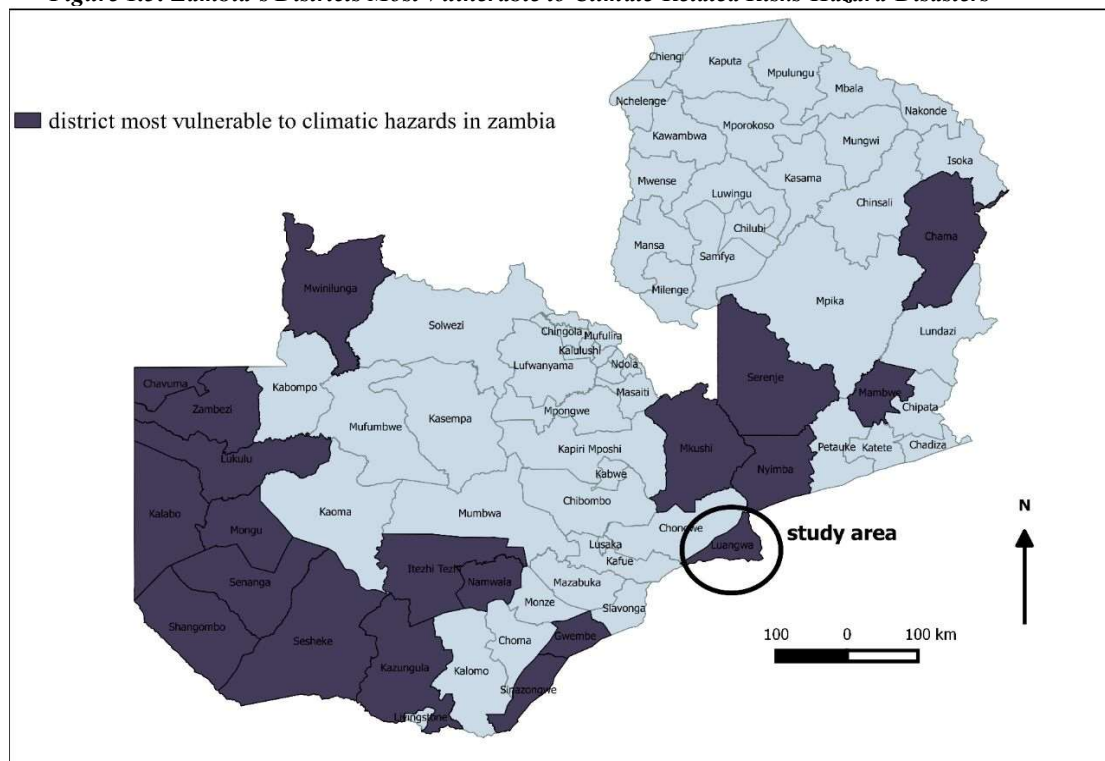
#### **1.1.1.4 Climate and Vegetation in Luangwa District**

The climate of Luangwa is characterised as dry and warm. It is a drought prone area with annual rainfall ranging between 600 and 800 mm (Luangwa District Situation Analysis, 2008). Luangwa generally experiences high temperatures reaching around 40 – 45 degrees Celsius in the months of October, November and December. In the cold season, from May to July, temperatures range from around 20 – 30 degrees Celsius (Luangwa District Situation Analysis, 2008). The hot climate results in high evaporation rates, which together with a short rainfall season makes droughts very common in the District. Due to the dry and warm climate, the vegetation of Luangwa is different from the higher parts of Zambia. In Luangwa you find for instance Baobab and Mopane trees, Masau bushes and the vast part of the District comprises shrubs and bushes. A lot of wildlife from big herds of elephant to a vast variety of birds is found in the District.

#### **1.1.1.5 Choice of Study Area**

Luangwa is located in ecological Zone I. This ecological zone is a low rainfall area and is one of Zambia's hottest, driest and poorest regions with frequent drought episodes (Siegel, 2008). Luangwa District was chosen for this study because it is a drought prone area. Within Luangwa District, some villages are more prone to drought than others. The small scale farmers who participated in this current study came from villages that were more prone to drought than others. Being a drought prone area, the researcher was confident that relevant information on drought coping and environmental learning for drought coping would be collected from Luangwa District. Figure 1.3 shows Districts that are vulnerable to climatic conditions in Zambia. The figure also shows the study area.

**Figure 1.3: Zambia's Districts Most Vulnerable to Climate-Related Risks-Hazard-Disasters**



*(Source: Zambia Vulnerability Assessment Committee (ZVAC), 2010)*

## 1.2 Statement of the Problem

Despite small scale farmers of Luangwa District using various drought coping strategies, they continue to experience drought impacts such as food insecurity. As a result, most such farmers in Luangwa District depend on relief food and various forms of help from the Zambian government (Kaminsa, 2008). The provision of drought relief or assistance has not helped much in the sense that the beneficiaries have shown increased vulnerability to future drought episodes by reducing their self-reliance and increasing dependence on government and donor organizations (Pulwarty *et al.*, 2014). In addition, the nature of environmental learning of drought coping among small scale farmers of Luangwa District is not known. Lack of information on the nature of environmental learning of drought coping among the target group constitutes a problem.

Environmental learning entails learning about environmental issues, in the environment (experiential learning) and for the environment (taking suitable action to solve the issue). Section 2.2.6 of this document elaborates on the concept further.



Lack of information on the nature of environmental learning of drought coping among small- scale farmers of Luangwa District means that decision makers and policy makers may be ill-equipped to come up with appropriate educational measures to enhance small scale farmer's capacity to cope with drought. Consequently, this situation could perpetuate vulnerability to drought hazard among such farmers with catastrophic results of food insecurity and hunger. In addition, the said situation may impede the realisation of Zambia's Sixth National Development Plan (2013 – 2016) whose vision is to have "a competitive and diversified agricultural sector driven by equitable and sustainable agricultural development" (Government of the Republic of Zambia, (GRZ) 2013).

Environmental learning related to drought coping strategies could empower small scale farmers with sound environmental knowledge and ultimately be able to deal with drought hazard in an efficient manner. One of the ways in which sound knowledge of drought coping among such small scale farmers of Luangwa District may be enhanced is to encourage environmental learning of drought coping. Environmental learning of drought coping could lead to positive actions, not simply the accumulation of inert knowledge or impractical skills (Environment Australia, 2000). Environmental learning of drought coping among Luangwa small scale farmers could also promote the need for personal initiatives and social participation which may lead to sustainability. In order to address the above problem, aim, objectives and research questions of this study, a qualitative approach was utilised.

### **1.3 Aim**

This study sought to examine environmental learning of drought coping so as to determine its appropriateness. The above aim was addressed through the following specific objectives:

### **1.4 Objectives**

1. To establish drought coping strategies among small scale farmers of Zambia's Luangwa district
2. To examine environmental learning related to such drought coping strategies
3. To propose how additional forms of Environmental learning may empower them in addressing drought for the future

In this report, the issue of vulnerability will feature prominently. However, this study did not see it necessary to pursue an objective on vulnerability because vulnerability has to do with capacity to cope with drought. Thus vulnerability has been covered under major objective one.

## **1.5 General Research Question**

What is the nature of environmental learning of drought coping among small scale farmers of Zambia's Luangwa District?

### **1.5.1 Specific Research Questions**

The main research question above was addressed through the following specific research questions:

1. What drought coping strategies are employed by small scale farmers of Zambia's Luangwa District?
2. What is the nature of environmental learning pertaining to drought coping strategies found among such farmers?
3. How could additional forms of environmental learning be used to empower the said small scale farmers in addressing the problem of drought in future?

## **1.6 Significance of the Study**

Information gained could be useful to the Ministry of Agriculture, Disaster Management Unit, policy makers and other organisations involved in drought management to plan for learning activities that would help small scale farmers be well informed on drought hazard, coping and mitigation. Since currently there is mealy information on how environmental learning could influence choice of drought coping strategies in Zambia, this study may add on to the existing literature on how environmental learning could be used to help small scale farmers cope with drought effectively. Ultimately this may improve drought coping among small scale farmers in the future. Vulnerable people need among others things, environmental knowledge of a threat, knowledge of action strategies and individual sense of responsibility in order for them to respond effectively to a threat. As a case study, it is also envisioned that future related efforts in similar drought prone areas of Zambia

and other countries with similar conditions to Zambia may be targeted with less difficulty based on the research findings of this case.

## **1.7 Organization of the Thesis**

The study consists of seven chapters. The chapters are described below.

### *Chapter One*

This chapter introduces the study and presents the background to the problem under investigation, statement of the problem, aim of the study, research objectives, general research question, specific research questions, significance of the study, organization of the thesis and a summary is given at the end of the chapter.

### *Chapter Two*

This chapter covers literature review that was considered to be relevance to the present study. This was done in the quest to position the study within the context of similar researches, whereby enriching it as well as providing a justification for it.

### *Chapter Three*

Chapter three elaborates on prominent research paradigms, theoretical framework, conceptual framework and a summary given at the end of the chapter. The paradigms discussed in this chapter were chosen for their prevalence in environmental educational research and education research as a whole.

### *Chapter Four*

The chapter describes methodology adopted for this study in order to address the research questions. The sections covered were as follows: research design, justification of research design, population, sample size, sampling technique, research instruments, data collection, data analysis, validation and trustworthiness, ethical considerations and summary.

### *Chapter Five*

This is a data presentation chapter. It presents the research findings on environmental learning for drought coping among the small scale farmers of Luangwa District. A summary is provided at the end of the chapter.

### *Chapter Six*

This chapter discusses the findings of the study drawing from critical realism, reviewed literature and theories that informed this study. Further, the researcher

added her voice in view of the above. The chapter also provides an environmental learning programme and a summary.

#### *Chapter Seven*

This is the concluding chapter. It summaries the research process by provided for a conclusion, recommendations and suggestions for future research.

### **1.8 Summary**

Chapter presents the background to the study, location of the study, statement of the problem, main research question, specific research questions, aim of the study, specific research objectives, significance of the study and organization of the thesis. Having presented the background that generated the need for this study, the next chapter presents a review of literature.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides a review of literature on drought coping and environmental learning for drought coping. It was difficult to find literature that directly connected drought coping and environmental learning. This situation stood out as a problem considering drought prevalence in Zambia and other parts of the world. This aspect represents one area of strength for this study because it has attempted to contribute by linking issues of drought to those of environmental learning. Another problem area related to the meaning of 'small scale farmer'. The term small scale farmer as used in this document could only apply in the context of Africa and Asia. The European context of small scale farmer was different and this situation stood out to be a problem as well. However, an attempt was made to single out certain Europe study that had an understanding of small scale farming that was close to Africa and Asia, for the purpose of broadening the picture. Review of literature was done systematically by coming up with general themes related to various perspectives. As part of assisting us to understand the breath and depths of drought, this study proposes a classification of literature on drought to cover historical, agricultural, drought and mitigation, geographical and spatial which are featured in the sections that follow.

#### **2.2 Review of Literature on Drought**

Under this section, review of literature on drought coping was done by classifying literature from historical, agricultural, geographical and disaster mitigation perspectives. Furthermore, a review of literature on drought and environmental learning was provided as epitomized in section 2.2.5 and 2.2.6 of this document. Sections 2.2.1 to 2.2.4 below are different from the general statements given in section 1.1 in the manner drought is presented. The former section merely provides a general picture of drought while the latter dwells on clarifying drought as studied from different perspectives.

### 2.2.1 Historical Perspective of Drought Coping in Zambia

Drought has always been part of the environment. A tale of Gilgamesh which dates back to second millennium Before Christ (BC) narrates how king Gilgamesh defeated drought in a form of a bull from heaven (Chifuwe, 2006). Perhaps the earliest record of drought occurrence and preparedness is the biblical story of Joseph. The pharaoh asked Joseph to plan and implement a national drought strategy (Yevjevich, Hall and Salas, 1978). In China, Kelly and Wright (1978) indicated that the first record of drought dates back to 206 BC. Chifuwe (2006) added on that there is also abundant literature that shows drought occurrences before and after 1778 in other parts of the world for example in Australia. In Africa, particularly Southern Africa, Eastern Africa and the Sahel region, drought episodes have always been a common feature (Grainger, 1990).

One of the countries in Southern Africa that has a relatively long history of drought is Zambia though the occurrence does not always spread across the country. Siamwiza (1998) noted incidents of droughts from 1824 to 1949. He stated that apart from violence, locust invasion and slave trade, droughts were responsible for famine in most parts of Zambia. He pointed out that between 1825 and 1890, Zambia suffered severe droughts such that agricultural productive and other economic activities in most parts of the country became impossible. In order to cope with drought, people depended on wild products such as fruits, flowers and tubers for food (Siamwiza, 1998). Siamwiza (1998) also explained that people's indigenous knowledge on ecological changes was helpful during drought and famine events. He reported that during dry years, most people settled along rivers valleys where early maturing seeds like *kaile* were helpful. Similarly, drought resistant crops like sorghum and millet was grown.

On the other hand, colonial relief effort was made by the missionaries. They gave food and took custody of some children. In 1909, Chikuni Missionaries employed women, girls, boys and young men in return for food. Other relief policies encouraged a labour migration. Without any doubts, Siamwiza's (1998) study gives some insights into the occurrence of drought events in Zambia between 1824 and 1949 and clearly highlights some drought coping strategies. However, the study does not clearly show the sampling procedure neither does it show the sample size for the

study (see section 4.2.4.3). Furthermore, the focus of the study was on the history of famine in Zambia which does not relate to drought as examined herein. This study examines environmental learning for drought coping.

In addition, Chabatama (1999) asserted that the colonial government emphasized on single crop (maize) cultivation in North Western Province of Zambia. Thus a combination of mono crop, bad tax policy and drought episodes culminated into food crises between 1902 and 1964. He claimed that the colonial government emphasized growing of maize neglecting other drought resistant crops that the local people lived on. Chabatama (1999) postulated that the local people had indigenous knowledge that enabled them to predict a bumper harvest and a looming hunger. One of the ways in which they coped with a looming drought was to invoke ancestral spirits to intervene in their situation. Other ways included scaling down on food intake and wives divorced lazy husbands then moved to food secure relatives. Others survived on hunting and gathering wild products. Although this study gives an enlightening account of peasant farming, drought and colonial governance, its focus was on food security in North Western province and not on environmental learning and drought coping strategies.

## **2.2.2 Geographical Studies of Drought in Zambia**

Zambia experienced significant dry spells between 1886 and 1970 such that the southern part of Zambia recorded a reduction in rainfall activities (Sichingabula, 1995). Sichingabula (1985) assessed rainfall variability and drought occurrence in Zambia since 1886. He noted below average rainfall between 1921 and 1987. This rain variability was also noted by Masi (1991) who reported that in 1972-73 and 1978-88, rainfall was inadequate for any maize variety. This variability in rainfall pattern resulted in a drought that lasted for 10 years (Sichingabula, 1985). Devoid of doubt, Sichingabula's study gave a profiling of drought prevalence from a geographical angle. Conversely, the gist of the study was a profiling of rainfall variability between 1921 and 1987. This study looks at how environmental learning could equip small scale farmers with knowledge and skills of drought coping.

Further, Sichingabula and Sikazwe (1999) investigated occurrence, severity and magnitude of hydrological drought in Zambia. They discovered that hydrological

droughts on Kafue and Zambezi rivers occurred in 60% and 58% of the time, respectively. According to them, the duration of droughts ranged from one to eight years on Kafue and up to 16 years on the Zambezi. They argued that there was need to have increased understanding of drought characteristics and sustainable use of water resources. The researchers' choice of study areas was thoughtfully chosen, being Zambezi and Kafue rivers, the major rivers that form drainage systems in Zambia. Further, the study was informative in the sense that studies on hydrological droughts are rare in Zambia and also that it gives information on how sustainable use of water resources could help Zambia more especially with the advent of climate change. However, the emphasis of the study was hydrological drought occurrence, severity and magnitude in Zambia. However, this study looks at drought coping in Luangwa District.

The 1991-92 droughts is said to be one of the worst droughts in Southern Africa (International Union for Conservation Nature (UNEP, 2006). Tiffen and Mulele (1994), stated that the 1991-92 drought led to wide spread food shortages and attendant social problems in Zambia. Tiffen and Mulele (1994), contended that although the 1991-92 drought episodes affected mainly the southern parts of the country, its impact was wide spread across the country and that other places that were hit by 1991-92 drought included valley areas in the rain shadow of Eastern Province and the southern Districts of Western Province. They further indicated that most streams and wells dried up and that water levels in large reservoirs such as Lake Kariba became low culminating into crisis for electricity generation. Due to drought, Southern Province saw unusually increase in cattle sale figures, cattle rustling, stock theft and charcoal burning (Chifuwe, 2006).

The government of Zambia reacted to the 1991-92 droughts by importing grain and requesting for food aid from well-wishers (PAM (1993) (see section 1.2). Consequently, NGO's and international organisations organised food distribution in rural areas through food for work programme or for free (Mukupu, 1994). In addition drought resistant crops were introduced and more wells and boreholes were drilled. However, those wells and boreholes were not deep enough to continue with water supply (Mukupu, 1994). Furthermore, aid made the beneficiaries to be more dependent on aid such that they had no capacity to effectively cope with other



droughts that came after the 1991-92 (Pulwarty *et al.*, 2014). Although this study gives a comprehensive report on the 1991-92 drought episode in Zambia, its cope was limited to an analysis and evaluation of the impact of the 1991-92 drought. However, this study proposes how additional forms of environmental learning could empower small scale farmers in addressing drought problem.

Chifuwe (2006) contended that in years 1982-85, 1992-95 and 2002-03, massive crop failure and animal losses were as a result of droughts in Monze District of Southern Province. He pointed out that during the 1991-92 drought episodes, a number of government and donor funded initiatives were implemented to help people of Gwembe Valley cope with drought. Other initiatives by the locals themselves included gathering of wild products, selling of fowls, pigs, goats, cattle and handcraft (see section 5.2.1). He construed that drought in rural areas could lead to rural development. However, what is evident is that drought has continued in Southern Province and people still show signs of dependence on government aid which counters the accession that drought could bring about development in rural areas. Nevertheless, this study examines environmental learning of drought coping.

Furthermore, Umar and Nyanga (2014) concluded that there was potential for higher production under Conservation Agriculture (CA) than under Conventional Agriculture (CV) during incidences of both drought and floods among the Zambian smallholder farming. These accessions are also supported by Nyanga, Johnsen and Aune (2011) who purported that early land preparation and planting associated with conservation agriculture increased chances of survival of the maize crop from floods and increased water retention capacity under CA than under CV during a drought year. However, the study covered only three out of ten provinces in Zambia and so it may not have been appropriate to conclude that CA had the potential in Zambia when the other seven provinces were not covered in the study. Even though, there is reference to previous works covering other parts of the country, again this does not change the focus of the study and therefore conclusions should have been limited to the areas under study. This study focuses on Luangwa District and all conclusions will be about the study area.

### **2.2.3 Mitigation Perspective**

Musimwa (2009) carried out a study on social economic effects of conservation in drought mitigation among Mpima women. He discovered that the 2003-05 droughts negatively affected the livelihood of Mpima women as most of them were small scale farmers. However, he failed to reach a conclusion as to whether conservation farming could mitigate drought because the community he investigated faced drought which was followed by floods during the period of study. However, this study establishes drought coping strategies among the small scale farmers of Luangwa District.

### **2.2.4 Agricultural Perspective of Drought Coping in Zambia**

Neshamba (2010), avowed that there had been little study done on tolerance of finger millet to drought. He noted that very few varieties suited to high rain fall areas had been investigated on and promoted leaving out the other two hundred and fifteen varieties in the national collections. He indicated that such limitations would impede food security as the frequency of drought was expected to intensify in most parts of Zambia. He therefore did a research to determine finger millet varieties that were drought tolerant in both high rainfall and low rainfall areas of Zambia and concluded that certain finger millet varieties were drought tolerant and could be promoted for sustainable drought coping. It must be noted that this study was a very important study in helping small scale farmers cope with drought. However, the study focussed on growing finger millet as a coping strategy without reflecting on how farming of finger millet could be conducted in an environmentally manner. Unsustainable farming practices can actually hamper food security by degrading soil quality such that with or without drought, crops cannot just survive. It therefore follows that, in the light of growing drought tolerant crops, small scale farmers should be educated on sustainable ways of farming. This study proposes how additional forms of environmental learning could empower small scale farmers of Luangwa District with knowledge and skills of drought coping.

### **2.2.5 Drought**

People attach different meanings and perceptions to drought depending on their specific interest (Palmer, 1965). For example, Michelo (2000) indicated that drought

perception in Africa brings to mind withering of crops and excessive high temperatures among the affected people. Because of different meanings and perceptions attached to drought, different scholars have categorised drought variously. The four types of drought recognised are agricultural, hydrological, socio-economic and meteorological, (Glantz and Wilhite, 1985). An *agricultural* drought comes in when the soil moisture drops to lower levels such that crop yield and agricultural production are negatively affected. In brief, the definition of agricultural drought hover around the soil moisture deficit relative to meteorological droughts and climatic factors and their impacts on agricultural production. Linsley, Kohler and Paulhus (1975) defined hydrological drought as a period during which stream flows are insufficient to supply established uses under a given water management system. Definition of hydrological drought revolves around the effects of dry spells on surface or subsurface waters. If the actual flow for a selected period of time falls below a certain threshold, then hydrological drought is considered to be in progress. Such a threshold level can be defined based on the flow characteristics or the water demand scenario of the place and/or basin under consideration. Meteorological droughts are said to occur when rainfall is below the range of values considered as normal (Kenpro, 2010). This deficit in the rainfall is quickly sensed and noticed, and meteorological drought has been the subject of numerous studies (Panu and Sharma, 2002). On the other hand, Socio-economic drought occurs when the demand for an economic good exceeds the supply as a result of a weather-related shortfall in water supply (Bang and Sitango, 2003; Kenpro, 2010). Kenpro (2010) postulated that socio-economic drought is connected to supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought.

In terms of definition of drought, there are variations to it as well. For example, Werick and Whipple (1994), defined droughts as periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in rainfall. Drought can also be defined as a prolonged and abnormally dry and hot period when there is shortage of water for the normal needs of the affected community or ecosystem (Environmental Emergencies News (EEN), 2004). Iglesias, Garrote, Cancelliere, Cubillo, and Wilhite (eds) (2009) gave a comprehensive definition of drought. According to Iglesias *et al.*,

(2009) drought is a hazard that results from a deficiency of precipitation from expected or “normal” such that when it is extended over a season or longer period of time, the amount of precipitation is inadequate to meet the demands of human activities and the environment. In this study, *drought is lack of rainfall that extend over a farming season or even much longer such that rainfall is inadequate to meet demands of anthropogenic activities and the environment at large* .

On the question of what causes drought, individuals have different understanding and explanations. For example, Panu and Sharma (2002) are of the view that the prime cause of drought is occurrence of below normal precipitation, which is affected by various natural phenomena. Others like Njovu (1993) perceive drought to be an act of God. Others still argue that the causes of drought are poor precipitation over a given region performs and that is accompanied by relatively high evaporation rates for prolonged periods (Kenpro, 2010). A more contextual understanding of what causes drought was given by (Chenje and Johnson, 1994; SADC, 2008). These argued that El Niño phenomena is associated with the reduction of Southern Africa’s rainfall, an impact that has led to the region experiencing frequent drought conditions. In addition, Wisner, Blaikie, Cannon and Davis (2004) contended that El Nino phenomena causes drought in different parts of the world. Wisner and others argued that droughts of 1875-1876 (northern China), 1877-1878 (Brazil, India and Morocco) and 1888-1889 (Russia, Korea and Ethiopia), were caused by El Niño effects. In the end, drought is part of natural processes and that effective management of their impacts could prevent catastrophic outcomes (Anderson and Woodrow, 1993; Unganai, 1994).

Further, drought is said to be a creeping hazard (Wilhte, 2003) thus vulnerability must be understood clearly and quantified (Dewin, 2013) if good policies for drought coping have to be put in place. Vulnerability is multifaceted and cannot be based on a single variable (Adger, *et al.*, 2003). Vulnerability to droughts and other hazards is seen as the intermingled effects of several factors within the system (Dewin, 2013) and the main factor being poverty. Watts and Bohle (1993) asserted that vulnerability entails exposure to disaster and lack of capacity to respond effectively to a disaster. Although Dewin (2013) argue against poverty being key factor that worsen communities’ vulnerability, scholars like (CEDRISA, 2009; Eriksen., O’Brien and

Rosentrater, 2008; and von Braun., Teklu and Webb, 1998) noted that the poor are incapable of coping with stress and are likely to be more affected than the well off. The poor are unlikely to buffer themselves against and recover from stress (Ribot, 2009) thus poverty is the most obvious physical vulnerability (Anderson and Woodrow, 1993).

In addition, drought impact negatively on all the dimensions of the environment. Among the rain fed agriculturists, its impact is immeasurable. It affects water systems climaxing in fights over water resources (Huho, 2012). Further, crop productivity goes down as such the affected communities have little to no food to survive on and ultimately no surplus to sell. Therefore, the health of both the affected community and their domestic animals are compromised since lack of food in one's body result in various ailments (Stanke, Kerac, Prudhomme, Medlock and Murray, 2013). However, United Nations International Strategy for Disaster Reduction (UNISDR) (2011) contended that poverty, existing health infrastructures, conflict and available resources with which to mitigate impacts of drought determines drought/ health relationships. Thus there is a complex relationship between morbidity and drought (Stanke *et al.*, 2013).

Furthermore, there is evidence that drought episodes are accompanied by insect infestations. According to Assessment Report (2003), severe weather conditions are usually followed by infestation. In 2000 and 2001, drought episodes in California brought about an increase in insect infestation (California Forest Pest Council, 2002). These insects are said to negatively affect any existing plants whereby compromising the already fragile environment (California Forest Pest Council (CFPC), 2002). The above information on drought is very important in helping the reader understand the various dimensions to drought hazard. However, the focus of this current study was drought coping and environmental learning for drought coping.

#### **2.2.6 Environmental Learning**

Environmental learning is used in different ways to mean different things, including forms of acquiring knowledge. Mostly, environmental learning is done outside of school (Falk, 2011). However, this is not to say that environmental learning does not

take place in formal education systems. Many institutions worldwide offer environmental programmes. For example, the University of Zambia, Rhodes University, University of Botswana and others offer programmes such as environmental education. These programmes are offered both at undergraduate and postgraduate levels. In learning that happens outside the school system arrangement, individuals go to national parks, and other natural phenomena to satisfy their inquisitiveness and to fulfill their needs for relaxation, pleasure, intellectual stimulation and even spiritual fulfillment (Brody, Tomkiewicz and Graves, 2002 ; Heimlich, Falk, Bronnenkant and Barlage, 2004). In Zambia, apart from game parks and natural wonders like the Victoria Falls, the general public and learners from different institutions get some form of environmental learning from botanic gardens such as Munda Wanga Botanic garden in Chilanga. Further still, radio programmes like Chongololo club of the air is instrumental as far as environmental learning is concerned. Others watch nature on television channels like national geographical channel and animal planet. However, this kind of learning may not reflect the principles of environmental learning as it may not foster agency in people especially in situations where people go to view nature for leisure and relaxation. Further, possession of sound knowledge as a result of learning remains a concealed clout as long as the empowered person does not use the knowledge to do something to perform some task, understand something, make a decision or solve a problem (Maceachren, 1992).

Learning is a complicated activity that involves various parts of the brain, parts of the body and multiple biochemical, bioelectrical and biomechanical processes (Falk, 2011). In the same vein, ‘stimuli’ result in different reactions by different persons as each person’s body mechanism is inimitable and thus responds in view of that. People learn through a continuous process of connecting past experiences to the current, relating what is happening in the present to what has happened previously (Falk and Dierking, 2000). Learning is a dialogue between the individual and his or her social/cultural and physical environment and may be said to be a contextually driven effort to make meaning (Falk, 2011). However, Kronlid (2009) pointed out that if learning spaces of capabilities are not expanded and enriched, learning conditions are not likely to get any better. In all, learning can be said to be is a broad

term that brings up not only changes related to facts and concepts, but also to feelings, attitudes and behaviors (Damasio, 1994; Falk, 2011).

Le Grange (2008) defines environmental learning as a language used to reinforce learner centred education. This definition is based on Le Grange's understanding of the post-apartheid type of education as enshrined in the national curriculum of South Africa. Still this definition may have nothing to do with learning, more especially the learning of the physical environment. Since environmental learning is a component of environmental education, in this study, environmental learning is *learning about the environment (environmental issue), in the environment (experiential) and for the environment (agency)*. Detailed explanations on environmental learning are given in the section that follows.

#### *About the environment*

Learners develop knowledge about an environmental issue. It is concerned with creating awareness with the aim of promoting understanding about human environmental interactions. It is characterized by education methods that aim at transmitting facts and gathering information that provides a foundation for thinking objectively and making reasoned judgment (Ministry of Education (MOE), 2000).

#### *In the Environment*

This is about processes that focus on exploring an environmental issue so that learners acquire necessary skills to address environmental issues. Environmental learning in the environment is anchored on learner's experiences in the environment as a basis for learning and developing new knowledge (MOE, 2000). Learning in the environment uncovers the prospects of learning in different contexts; in formal school setting, local communities and more or less natural setting with a shift away from textbook based learning to experiential teaching (Le Grange, 2008). Direct experience with the environment, both individually and in groups, is a vital way to learn about environmental issues and can foster a number of intellectual skills in learners (Fien, 1993b).

#### *For the Environment*

Focus is on taking action for the environment so that learners develop values and positive attitudes and necessary skills to address environmental issues. The aim is to develop a sense of responsibility in learners to get actively involved in resolving environmental issues (Ndaruga, 2013). Action for the environment can also be called

agency. Agency is the capacity to act and bring about change and whose achievement can be evaluated in terms of one's own principles (Sen, 1992). Agency expands the possibility of concern beyond a person's own wellbeing (Sen, 1997; Unterhalter, 2009), to include, for instance trepidation for the endangered Zambian white rhino or helping street kids.

Environmental learning also entails continuous acquisition of new knowledge, as well as developing the ability to engage in new environmental behaviour and practice (Hein, 1991). All environmental learning (whether it is in the form of Environmental Education, Ecological Education or Education for Sustainable Development) aims to incorporate environmental thinking and ideas into learner's everyday lives (MOE, 2000). Environmental learning promotes; integrating science and social sciences with a multi-disciplinary approach, learning about the Earth's ecosystem, identifying our individual and cultural values and making informed and responsible choices and critiquing societal and industrial practices that contribute to environmental problems. Further, environmental learning considers multiple models for teaching and learning, as well as teachers' own pedagogical content knowledge to form a unique blend of disciplinary knowledge combined with teachers' knowledge about specific learning contexts (MOE, 2000). Environmental learning seeks to inspire learners towards reflective practice. It is an educational catalysis designed to set the tone for developing knowledge, understanding, skills and values for creating and sustaining change. Environmental learning should be collaborative (ready to execute social capabilities), empowering (unravel innovativeness and potential contribution that lies in every human), emancipation (critiquing, construct and act with autonomy) and transformational (embracing and adapting to new situations) (Global Action Plan (GAP), Southern African Development Community (SADC) and Swedish International Centre for Education for Sustainable Development (SWEDESD), 2012; SWEDESD and SADC REEP (Regional Environmental Education Programme), 2013). Whether to stay knowledgeable and up-to-dated on environmental issues or to feel comfortable that we are not doing anything awful to our planet, environmental learning should be a lifelong commitment. Global environmental concerns will increasingly require humans to be responsible in terms of innovation and be able to face important requirements not only in financial terms but also in terms of learning



new knowledge (e.g. skills and practices) to address the broader agenda of sustainable development (Boiral, 2002).

### *Unlearning*

Environmental learning also entails unlearning undesired behaviour. Because environmental issues are complex, there are misconceptions on what they really are, their causes and effects and how to manage them. Misconceptions are common especially among the rural communities. Muchanga (2013) discovered that the respondents associated climate change with witchcraft and indicated that the ancestors were frustrated by the moral decay in the communities. It is such misconceptions that need to be unlearned and be replaced by new knowledge and knowledge structures and this could be best done through environmental learning. Unlearning and forgetting are related concepts that have attracted academic attention for a long time (Becker, 2005; Cegarra and Sanchez, 2008; De Holan and Phillips, 2004). Although an overlap may be seen between unlearning and forgetting, the two processes are not alike. According to De Holan and Phillips (2004), forgetting is a failure to become mindful at the appropriate time like, when someone forgets oneself and loses self-esteem. In terms of learning, forgetting refers to the loss of knowledge already learned in an individual's long-term memory (Smunt, 1978). On the other hand unlearning is an adaptation process where the new knowledge and knowledge structures have to replace old knowledge and knowledge structures (Akgu'n, Byrne, Lynn and Keskin, 2007). Unlearning encourages contesting accepted supposition, values and norms as a step forward to learning new things (Hedberg, 1981). Having presented literature on drought, environmental learning and drought coping from different perspectives, the next section presents literature on spatial levels of drought.

### **2.3 Spatial Levels of Drought**

The spatial approach looks at literature on small scale farmers' learning and drought coping at various levels of the global, Sahel region and Eastern Africa, Southern Africa and Zambia.

### **2.3.1 Small Scale farmers' Learning and Drought coping at Global Level**

There had been an increased occurrence of drought episodes wide world in the twentieth century (AghaKouchak and Damberg, 2013; Alexander, Zhang, Peterson, Caesar, Gleason, Klein, Haylock, Collins, Rahimzadeth, Tagipour, 2006). Major drought events have been reported in the United States of America (U.S.A), Horn of Africa, Sahel, Southern Africa, Australia and Europe (AghaKouchak and Damberg, 2013; Haile, 2006).

Like any other country, droughts affect Norway negatively (Krokene, Gebauer, Volařík Urban, Børja, Nagy and Eldhuset, 2015). Norway has a predominantly small-scale farm structure and that the choice of crops grown on these small-scale farm holdings and yields are highly dependent on the climatic conditions (Hele, 2003). Hele (2003) indicated that small scale farmers in the Norwegian context are farm holders with farm land of 10-15 ha. Because of climatic variability and other factors, small scale farmers in Norway combine income from farming, forestry and off-farm activities. In addition, the government of Norway offer its support to the small scale farmers by offering advisory services. Other help from the government is education in general agriculture and not specifically on drought (Hele, 2003).

Another hazard prone country is India. Drought hazard in India significantly affect small and marginal farming community because their cropping pattern is rain water-dependent (Pandey, 2009). Some of the drought coping strategies utilized by these farmers include soil conservation, afforestation and moisture conservation through rain water harvesting and groundwater conservation (Pandey, 2009). Information relating to long-term mitigation measures like moisture conservation, watershed management, the conjunctive use of harvested surface water along with ground water, appropriate cropping patterns that would minimise water needs and the requisite knowledge for drought-preparedness planning exist in India (Abedullah and Pandey 1998). Further, technological improvements are in place to help dissemination information on drought forecasting- that is monitoring the onset and progress of rainfall (Abedullah and Pandey 1998). However, marginal farmers in India have no access to technology (Pandey, 2009). Furthermore, failure of the extension system to disseminate vital knowledge to marginal farming communities and lack of infrastructure support has deprived farmers of the vital information

needed to protect them against drought offshoots (Pandey, 2009). Additionally, because of lack of infrastructure support, there has been growing disjunction in the water resources such that the neglect of tanks which harvest rain water has been associated with growing reliance on well irrigation (Rao, 2000).

### **2.3.2 Small Scale Farmers' Learning and Drought Coping in Sahel region, Eastern Africa**

Phases of strong warm and cold ENSO episodes have been a source of large-scale rainfall irregularities over many parts of Africa including the Sahel region, Eastern Africa and Southern Africa (Folland, Palmer and Parker, 1986; Haile, 2005; Nicholson and Etekhabi 1986; Ogallo, Janowiak and Halpert 1988; Ropelewski and Halpert 1989). Droughts persist and vary across regions, seasons and year. Drought impact negatively on agriculture, water resources, and natural vegetation and indirectly on health and economy (Benson and Clay, 1994). Africa's dry climate and dependency on rain fed agriculture by most peasant farmers make drought hazard a serious threat across the continent. In recent years, the largest food crises in Africa that required large-scale external food aid have been attributed fully or partially to extreme weather events (Dilley, Chen, Deichmann, Lerner-Lam and Arnold, 2005). The food crises of 1974, 1984/1985, 1992 and 2002 that affected the lives and livelihoods of millions of rural households had been mainly caused by droughts (Haile, 2005). During the food crises of 1974, 1984/1985, 1992 and 2002, countries that experienced high-drought frequency were agro-pastoralists whose livelihoods are constantly threatened by rainfall variability and are among the poorest in Africa (Dilley *et al.* 2005; Haile, 2005). For example, in Sahel and Horn of Africa where the 1960, 1970 and 1980 drought triggered widespread starvation and loss of life (Haile, 2005).

In Kenya, drought episodes results are a complex web of impacts that spans many sectors of the economy and reached well beyond the area experiencing physical drought (Kenpro (2010). Because of its negative impact on agriculture, Chumo and Agui, (2012) reported that during drought episodes, small scale farmers around Lake Victoria basin in Kenya engaged in drought coping strategies such as planting of drought resistant crops and food storage sharing. Chumo and Agui (2012) stated that even if the people around Lake Victoria basin used the above coping strategies,

drought that affected Kenya in the year 2000 and 2010 resulted in loss of lives, loss of livestock, power rationing and drying of agricultural crops among other problems. In Kenya and neighbouring countries, most small scale farmers are usually pastoral farmers thus drought occurrence ensure in fights over control of and access to natural resources principally water and pasture (Huho, 2012). For example, the 2004 drought triggered conflict between the Pokot from Kenya and the Sabei from Uganda as they competed for pasture and water around Mt. Elgon region and in Kapchorwa and Nakapiripit Districts in Uganda leading to deaths of 10 people (Hugo, 2012). In addition, the search for pasture forced the Pokot pastoralists to move to Mt. Kadama in the Pokot-Uganda border triggering conflicts with the Karamajong during the 2007 drought (Huho 2012). Further still, the 2011 drought episode in the arid northern Kenya depleted pasture and dried water points in Moyale, triggering inter-clan attacks and counter-attacks where seven people were killed in Burji, Moyale town (International Organization for Migration [IOM], 2011). Other water and pasture-related conflicts in Kenya occurred in 2009, 2011 and in early 2012 (Huho, 2012). In connection with water conflict, Juma (2000) noted that although peace building initiatives are helpful in conflict resolution, conflict over access to water and other natural resources are difficult to resolve.

Other countries that have had small scale farmers engaging in drought related conflict include Sudan. Like in West Pokot County, Pleijel, Kioi, and ICRC/SRC/KRC (2005) claimed that the main cause of conflicts between tribes in Darful in Sudan is water, pasture and other natural resources. Pleijel *et al.*, (2005) observed that changes in rainfall patterns in the last 20 years have led to decline in water resources triggering water conflicts. The above cases in Kenya, Uganda and Sudan are critical cases in highlighting drought - conflicts dynamic. However, the focus of these studies was not on environmental learning for drought coping but on natural resource conflicts as a result of climatic variability.

Mogues, Nyangito and Nyariki (2006), claimed that Ethiopia had for the past 20 years been faced with some incidents of major food crises due to drought and unstable political environment. Although small scale farmers had coping strategies in place, the drought of late 1990 was prompted by failure of three concurrent agricultural seasons that culminated in massive humanitarian crisis (Disaster

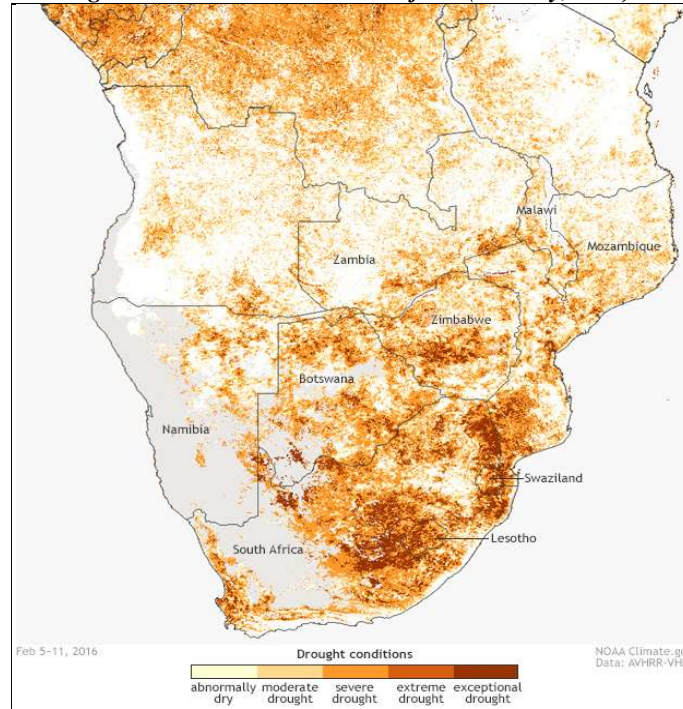
Prevention and Preparedness Commission (DPPC), 2000). Nevertheless, Mogues *et al.*, (2006) claimed that during 1997- 2003 drought, the fortunes of the poor improved though it could not keep them from hunger and poverty. They concluded by raising questions on how policies affect the pattern of poverty. This study is very informative and highlighted drought - poverty dynamic as an important ingredient for viable policy formulation. However, on research instruments, more qualitative research instruments could have been used to collect the needed qualitative data. It can be argued that interview guides, focus group discussions and observation guides would have been more appropriate considering the nature of the study.

Like any other countries, dissemination of agriculture information to small scale farmers in the above cases was dominated and provided by extension services and credit, controlled the provision of inputs and bought marketed outputs (Schwartz and Kampen, 1992). The prevailing extension system was based on the *diffusion of innovation* concept developed by Rogers (1962).

### **2.3.3 Small Scale Farmers' Learning and Drought Coping in Southern Africa**

Most Southern African countries are susceptible to drought receiving on average about 300-600 mm of rain per year (Mhike, Okori, Kassie, Magorokosho and Chikobvu, 2012). This exposure to drought hazards has necessitated responses involving numerous coping strategies among the communities (Enfors and Gordon, 2008; Eriksen and Silva, 2008). Figure 2.1 shows drought prevalence in Southern Africa.

**Figure 2.1: Drought Occurrences in Southern Africa (January, 2016)**



**(Source: Dan Pisut and Climate.gov, 2016)**

In drought prone areas where most of Zimbabwe's smallholder farmers live, (Banziger and de Meyer, 2002; Mhike, Okori, Kassie, Magorokosh and Chikobvu, 2012) noted that some farmers preferred planting early maturity maize as a drought coping strategy. In other semi-arid zones of Zimbabwe, such as Chipinge and Chimanimani farmers grew short season cultivars seeds such as SC403 and PAN413 (Derera, Tongoona, Langyituo, Laing and Vivek 2006). Others like the Mutoko farmers preferred early maturing open pollinated varieties (OPVs) such as ZM421 and ZM521 to hybrids Mhike *et al.*, 2012). Information on maize cultivation was disseminated through extension services from the ministry of agriculture, from Non-Governmental Organisation and also through farmer to farmer information exchange (Zegeye, Tadesse and Tesfaye, 2001). However, lack of knowledge on the best varieties of maize seed for small scale farmers' respective areas and the cost of inputs were noted to be major constraints (Langyintuo, Mwangi, Diallo, MacRobert and Dixon, 2008). This also casted a dark shadow on the nature of learning that the small scale farmers were exposed to. In that, the learning process was not sufficient enough to offer the small scale farmers with vital information needed to help them cope with droughts in an efficient manner. In as much as the Zimbabwean studies

contextualised coping strategies in terms of drought tolerant maize varieties in areas where successful maize production entailed food security, focussing on maize production is like putting all eggs in one basket. Successful drought coping entails being knowledgeable on a number of other drought coping strategies so that if strategy A fails, one must be able to make use of Strategy B. Besides, maize crop is said to be very vulnerable drought (Rafael, Mazuze, Mwangi, Langyintuo and Kassie, 2011).

In Kgalagadi North and Bobonogi Sub districts of Botswana, Mogotsi, Nyangito and Nyariki (2011) discovered that the government and the small scale farmers evolved different ways of coping and managing drought. The government introduced Labour Intensive Public Works Programme which was aimed at avoiding deaths, migration and safeguarding rural household assets. The government of Botswana contracted 15 percent of small scale farmers to do local dam construction, constructing soil erosion barriers, clearing bush along road sides, creating and maintaining firebreaks. A small amount of money was paid to them (Ministry of Local Government, 2009). Further, the government of Botswana provided animal feed at heavily subsidized prices to the communities of Kgalagadi North and Bobonogi. The government also encouraged the communities to dig bore holes which could be used as sources of water. Other strategies employed by the small scale farmers included harvesting phana caterpillar of imbrasia belina moth for household consumption and for sale, sale of natural resources such as firewood, honey, wild fruits and vegetables classified as weeds during years of good rainfall. Other sources of income for small scale farmers during drought episodes included; beer brewing, selling craftwork and fat cakes. In terms of accessing information on drought coping, Mmopelwa, Kolawolea, Wolskia and Ngwenyaa (2014), indicated that small scale farmers did not have access to weather information from formal institutions. Majority of the farmers mainly obtained information on drought coping from elderly people within their neighborhood and through native diviners/doctors (*Dingaka*) (Mmopelwa *et al.*, (2014). Although drought has continued to affect small scale farmers negatively, the drought management strategies employed by the government of Botswana and drought coping strategies employed by small scale farmers of Kgalagadi and Bobonogi communities were helpful in coping the drought. However, it must be

stated that the gist of the above study was drought management strategies unlike this current study whose orientation is drought coping and environmental learning for drought coping.

#### **2.3.4 Small Scale Farmers' Learning and Drought coping in Zambia**

Zambia faces sporadic food crises because of recurrent drought spurts. In provinces such as Central and Southern Provinces where harvest of maize used to be around 2.4 metric tonnes per hectare, the usual yield went down to 1.5 metric tonnes per hectare (Mulenga, 2003). As a result, Zambia had to depend on the international community to provide food aid amounting to 970,000 tons (for the 1991/1992 drought) and 81,274 metric tons (for the 1995/1996 drought) of grain (Mubanga, 2014; PAM, 1993). Between 2001 and 2002, another devastating drought was preceded by floods in selected regions at early stages of the crop season followed by dry spells making most parts of Zambia to experience maize shortage needed to meet the annual domestic consumption requirement (World Bank, 2007). Close to 2.9 million people in 38 Districts out of 72 Districts in Zambia were severely affected by food shortages (World Bank, 2007). In order to cope with droughts, small scale farmers increased on income-generating activities. Assets such as livestock, chicken and goats played a critical role in drought coping as those were sold to raise money for food during drought years (Banda 1993, Carr 1997). Furthermore, small scale farmers changed their consumption patterns in drought situations. Consumption patterns included reduction in the number of meals eaten, increased consumption of wild and famine foods such as leaves, berries and rodents (FAO, 1997). Further, FAO (1997) noted that in Mantapala of Zambia, nearly all households preserve some local vegetation at the end of the rainy season between February and May to overcome seasonal shortages. Another coping strategy that small scale farmers used was cultivation of one or more maize varieties or use of early maturing maize varieties (Mubanga, 2014). Nevertheless, drought continues to be a challenge among small scale farmers because maize crop is particularly susceptible to low moisture availability and very hot spells (Banziger and de Meyer, 2002).



#### **2.3.4.1 Government, International Organisations and Non-Governmental Organisation efforts in Stimulating the Agriculture Sector**

This study sees it fit to include government and stakeholders' efforts in stimulating the agriculture sector. In as much as this information is not on drought coping strategies, it gives important highlights on efforts targeted towards revamping the agriculture sector in Zambia. The government of the Republic of Zambia through the Ministry of Agriculture and Livestock and Ministry of Finance developed the Agricultural Commercialization Programme (ACP) and Poverty Reduction Strategy Programme (PRSP) that strive to stimulate the development of a well-organized, competitive and viable agricultural sector that would enhance food security and increase income for the farmers. Thus most of the strategies instigated by the government of the republic of Zambia, donor agencies and Non-governmental Organisations are implemented because they are believed to have the capacity to reduce poverty levels among small scale farmers, lessen farmers' costs, increase crop yields, reduce food security risks, minimize the chances of crop failures in drought years, increase farmers' profits, and in time improve the fertility of their land (Kabwe and Donovan, 2007). However, although minimising chances of crop failure in drought years is mentioned here, these strategies are not generally targeted at drought but agriculture activities in general.

Ruttenberg (1980), noted crop diversification as a worth trying strategy in the tropics. In line with this accession, the government of Zambia through the Ministry of agriculture strongly promoted cassava as a nutritionally alternative strategic to maize because the latter is susceptible to climatic conditions like drought. The Government of Zambia sponsored seed foundation sites at Mansa and Mutanda Research Stations through the Root and Tuber Improvement Programme (RTIP) (Barratt , Chitundu, Dover, Elsinga, Eriksson, Guma, Haggblade, Haggblade, Henn, Locker, Donnell, Smith and Stevens, 2006; Haggblade, 2006). Other international and Nongovernmental Organisations embarked on promoting cassava, millet and sorghum production and training small scale farmers on how to grow the said crops. However, not all small scale farmers adopted cassava and other cereals due to cultural and other reasons. The implication was that, food insecurity and ultimately

drought continued to be a challenge among small scale farmers and the community at large.

Another strategy was the introduction of the Programme against Malnutrition (PAM). The programme was supported by the Ministry of Agriculture and implemented the Drought Rehabilitation Programme (DRP) from 1995 to 2000 (Mukupo, 1994). The DRP sought to revitalize the farmer's productive capability in the country. In 2000, PAM formed the Smallholder Access to Processing, Extension and Seeds Project (SHAPES) to promote small scale farmer's food productivity. The project phased out in 2004. Since then, PAM implemented the Food Security Pack with Government support. The food security pack included a cereal, a legume and a root or tuber crops. Conversely, such interventions may immediately improve the material conditions of life in the existing drought and not the subsequent droughts (Masendeke and Shoko, 2014). It must be stated that at the time of the research, PAM and the subsequent projects were completely phased out hence raising questions on the sustainability of the programme.

In 2006, Peri-Urban Self Help (PUSH) on behalf of World Food Programme (WFP) started operating a food for assets project in Sesheke (Mukupo, 1994). The programme used food rations as an incentive for vulnerable households (the hungry, those nursing the terminally ill and persons taking care of the OVCs) to invest 4 hours per day in developing group assets. The households were given the food rations while the asset project continued with the development of cassava nurseries. PUSH later phased out. While this aid from PUSH was logical and well-intended, the unpredicted end behaviour of the recipients produced the opposite to what it was intended for. Undoubtedly, many lives were saved from hunger but this caused long time dependence among the beneficiaries on outside help (see section 1.2). When PUSH could no long sustain the aid and phased out, the people fail back to ground zero.

Another strategy was the introduction of conservation farming methods. Conservation farming had been extensively promoted in Central, Lusaka, Southern and Eastern provinces where rainfall has been inconsistent. The agricultural policy since the mid-1990s has been to continue promoting conservation farming practices

more especially among the small scale farmers (MACO, 2004). Conservation farming, as applied in Zambia, generally encompasses: dry-season land preparation using minimum tillage systems; crop residue retention; seeding and input application in fixed planting stations; and nitrogen-fixing crop rotation (Haggblade and Tembo 2003a and 2003b). Although conservation farming has shown to be helpful, there are relatively high disadoption rates among the small scale farmers (Kabwe and Donovan, 2007). Subsequently, drought continues to impact negatively on small scale farmers' livelihood as shown in the proceeding quotes;

*Farmers in Zambia have tried new farming methods to combat the drought. They have tried new types of seeds and new methods of crop rotation. They have tried drought resistant crops such as cowpeas and cassava instead of maize. Farmers met with some success but were still struggling against the droughts. People in Zambia who live off the land as well as city dwellers have all felt the effects of the droughts (Fabian, 2016)*

*Zambia's drought situation has a cascading effect throughout important sectors of the economy. The Zambian government is considering asking farmers to make certain changes in crop production, such as importing maize from South America, to help with the deficit. As if the drought is not bad enough, the country also contends with a severe power shortage that partly stems from insufficient water levels to sustain hydropower needs. The government plans to issue over one million energy-efficient light bulbs after imposing a ban on traditional light bulbs, but this is a temporary solution when considering the weight of the problem. Many citizens must contend with power outages lasting up to eight hours a day, sometimes longer as imports become rare in a high-demand market (London Commodity News, 2016)*

Although the above newspaper quotes may not be trustworthy because of their authenticity, the researcher argues that the quotes indicate that drought has continued to be a menace in Zambia.

#### **2.3.4.2 Small Scale Farmers' Learning**

Small scale farmers' learning about farming activities in Zambia is mainly served through extension system. This form of learning was delivered through a linear mode of technology transfer to improve production (Mbozi, 2000). The success of learning was measured by the rate of adoption without giving farmers a voice in the whole process (Mbozi, 2000; Worth, 2006). The key assumption in linear mode was that scientists did the research and design, extension workers disseminated and farmers consumed (Leeuwis, 2004). Linear mode has been criticised because it comprises supply-driven by scientists; a lack of consideration of local knowledge, diversity, sustainability and farmer needs; and farmer inability to afford the kind of technologies being promoted (Mutuke, 2010). However, Mutuke (2010) noted that in Southern Africa, some positive changes had occurred in the way extension services were carried out over the past decades. He contended that scaffolding, cultural interpretation (Edwards, 2005) and collective interpretation of learning would be helpful in farmers' learning processes. Mukute (2010) advocated for farmer - centred learning approach. In addition, others have contended that farmers must be allowed to embrace modern scientific knowledge without abandoning traditional scientific knowledge (Sikana 1994; Chamber 1997; Visvanathan, 2006; CARE 2010).

Mbozi (2000) noted that as early as 1947, small scale farmers of the plateau in Southern Province of Zambia were provided with an extension scheme by the colonial government. The scheme provided extensive messages to the members of the scheme and these farmers who were not members learnt from agricultural shows. She argued that the government used the public model to reflect the services offered to any person in the country who engaged in farming. Further, her research findings showed that small scale farmers' learning processes about crop marketing in Southern Province of Zambia involved the following:

1. farmers' involvement in discussions with other people
2. guidance and correction from experts and other people
3. through apprenticeship
4. acquisition of information from other people
5. observing other people
6. farmers' engagements in experiments

Mbozi (2000) study is very enlightening on farmers' learning processes. However, the focus of the study was about small scale farmers' learning processes in crop marketing, while this present study focuses on examining environmental learning for drought coping among the small scale farmers of Luangwa District.

Makasa (2002) also noted that small scale farmers' learning in Zambia is through extension system under the ministry of Agriculture and Livestock. In order to get to small scale farmers, models such as diffusion, research and development, and social interaction models are used (Van de Ban and Hawkins, 1988). Masaka (2002) explained that extension contacts with the farmers was through farm visits, demonstration, field days, extension meetings, farmer courses/training and other extension services. According Makasa (2002), farmers' field school and visit does not allow for exchange of information between farmers and extension officers. He argued that the preceding processes tended to be more top-down in nature in that they gave little attention to small holder farmers' input in the extension system. Without qualm, Makasa (2002) study is very informative on operations of extension service in Zambia but his focus was extension service delivery with respect to the participation of smallholder farmers. This study however, focuses was on developing an Environmental learning programme for drought coping.

In addition, Mbashili (2007) pointed out that agriculture radio programmes to enlighten small scale farmers on various issues related to farming in Zambia was initiated by UNESCO as early as 1960. He explained that radio forum groups were set up in rural areas throughout the country. Small scale farmers were encouraged to listen to radio programme through the National Agriculture Information Service (NAIS). NAIS also engaged in production of agriculture television programme, publication of magazines, newsletters and posters to provide the farming communities and other stakeholders with various kinds of agricultural information. Mbashili (2007) gave another dimension to the importance of extension services to small scale farmers. His study however, centred on radio farm forum as a communication strategy in agricultural extension services. This study establishes drought coping among the small scale farmers of Luangwa District.

Suzuku (2002) emphasized that Zambia has a long history in agriculture information delivery services through mass media such as radios, television and printed materials including newspapers. In terms of other extension services from the Ministry of Agriculture, extension officers personally visit small scale farmers and advise them on various agricultural topics (World Bank, 1986). Other approaches used by the extension system in Zambia include farmer field schools training and visits and farming system research (Makasa, 1998; Sutherland 1988; World Bank, 1986). Field days are also organised in various areas to encourage sharing of knowledge and experiences among farmers and also on-farm demonstration plots, to farmer training (Chaudhury, Ajayi, Hellin and Neufeldt, 2011). The private sector and the government introduced out grower schemes through which small-scale farmers are provided with extension services (Bangwe and Koppen, 2012). On climate change education, small scale farmers' knowledge and actions concerning the planting of fertilizer trees have been supported and enhanced by agricultural extension agents and several NGOs (e.g. Plan International, World Vision) (Chaudhury, *et al.*, 2011). Undoubtedly Zambia is doing its best in making sure that the farmers are well informed on good farming practice. However, not all small scale farmers may have access to radios and television set and also the fact that there are possibilities of inaccessible extension services due to remoteness of certain rural parts of Zambia.

From the preceding discussion, it is can be deduced that small scale farmers' learning in Zambia has been on farming in general and not specifically on drought. Though drought occurrences have increased in the recent past, little to no deliberate environmental learning for drought coping seem to be in place to help small scale farmers cope with drought. Although environmental learning is vital for effective drought coping, there are few studies that have directly connected environmental learning to drought coping. Studies are uncommon on topics such as examining environmental learning pertaining to drought coping. The present study seeks to contribute by examining environmental learning for drought coping among the small scale farmers of Luangwa District.

## **2.4 Summary**

This chapter provided a review of literature. Review of literature covered drought coping from, historical, geographical, and agricultural and mitigation angles. A review of literature was also done on small scale farmers' learning and drought coping. The review of literature has brought out important points. Some of the points are that small scale farmers' learning is mainly served through the extension service. Another key finding is that small scale farmers' learning is basically on generally farming practices despite small scale farmers' exposure to different environment issues that may demand situated form of learning.

The next chapter addresses research paradigm that are prominent in environmental education and education, conceptual framework and theoretical framework.

## CHAPTER THREE

### CONCEPTUAL, THEORETICAL AND PARADIGMATIC FRAMEWORKS

#### 3.1 Introduction

This chapter aims to discuss prominent research paradigms or research philosophies in environmental education and education in general, thus demonstrating awareness and understanding on how the choice of a paradigm underpins the entire study. The chapter also tries to show how paradigms differ amongst them. The conceptual and theoretical frameworks are also included towards the end of the chapter. For this study, the paradigm used was critical realism, for the justifications elaborated in items 3.2.5. Conceptual and theoretical frameworks are also included towards the end of the chapter.

Since all researchers have inherent preferences that are likely to shape research designs (James and Vinnicombe, 2002), it is important to consider different research paradigms and matters of ontology and epistemology. Research paradigms describe perceptions, beliefs, assumptions and the nature of reality and truth, and consequently influence the way in which the research is carried out, from design through to conclusions (Lather, 1986).

It is important to understand and discuss these facets so that approaches congruent with the nature and aims of the particular inquiry are adopted, and to ensure that researcher biases are understood, exposed, and minimised (Flowers, 2013). However, these preferences must be considered in the light of the original research problem (Blaikie, 2000). Blaikie indicated that if this is not done, methods incompatible with the researcher's stance may be adopted, with the result that the final work will be undermined through lack of coherence.

#### 3.2 Research Paradigm

The term paradigm comes from the Greek word *paradeigma* which means pattern and was initially used by Thomas Kuhn (1962) to denote a conceptual framework held by a community of scientists which gave them an expedient framework for investigating problems and finding solutions. Kuhn (1977) defined a paradigm as a



research culture with a set of beliefs, values, and assumptions that a community of researchers has in common regarding the nature and conduct of research. It can also be a pattern, structure and framework or system of scientific and academic ideas, values and assumptions (Oslen, Lodwick, and Dunlop, 1992). Paradigms are an interpretive framework and a basic set of beliefs that guide action (Denzin and Lincoln, 2003). Referred to as the research paradigm (Blaikie, 2000) or research philosophy (Saunders, Lewis and Thornhill, 2007), these are formed from basic ontological and epistemological positions. Philosophical assumptions or a research paradigm about the nature of reality are crucial to understanding the overall perspective from which the study is designed and carried out.

Ontology make claim about what exists, what it looks like, what units make it up and how these units interact with each other (Blaikie, 1993). Ontology describes our claims or assumptions on the nature of reality whether objective reality that really exists or subjective reality created in our minds (Flowers, 2013). On the other hand, the term epistemology originates from a Greek word epistêmê, their term for knowledge. Epistemology is the philosophy of knowledge or how we come to know (Trochim, 2000). Epistemology gives a guide on the most appropriate ways of inquiring about the nature of the world (Easterby-Smith, Thorpe and Jackson, 2008) and ‘what is knowledge and what are the sources and limits of knowledge’ (Eriksson and Kovalainen, 2008). Epistemology is closely linked to ontology and methodology; as ontology involves the philosophy of reality, epistemology addresses how we come to know that reality while methodology identifies the particular practices used to attain knowledge of it (Hatch and Cunliffe, 2006). Researcher’s philosophical lenses therefore play a vital role in the choice of methods because the underlying belief system of the researcher (ontological assumptions) largely defines the choice of method (methodology) (Chia, 2002).

Five paradigms are briefly discussed. These paradigms are chosen for their prevalence in environmental educational research and education research as a whole (Rickinson 2001; Lozzi, 1981; Robotton and Hart 1995; Schudel 2013).

### **3.2.1 Positivism**

Positivism is bracketed together with a wide range of theories and practices, such as Comtean-type positivism, logical positivism (non-realism), behaviourism,

empiricism, and cognitive science (Hwang, 1996). At times, it denotes 'scientific method' or 'science research' (Mackenzie and Knipe, 2006). According to French Philosopher August Comte, observation and reason are key to understanding human behaviour and that the basis of true knowledge is experience of senses. To discover reality, positivists focus solely on facts gathered through direct observation, experience and measurements using quantitative methods such as surveys, experiments and statistical analysis (Easterby-Smith, Thorpe and Jackson, 2008; Eriksson and Kovalainen, 2008; Hatch and Cunliffe, 2006; Saunder, Lewis and Thornhill, 2007; Neuman, 2000). They argue that knowledge consists of facts and that there is only one absolute reality which is always independent of social construction (Walsham, 1995). In order to enhance predictive understanding of the phenomena under study, positivists have a propensity to test theory (Hirschheim, 1985; Myers, 1997) and use scientific methods to discover reality.

Although positivists posit that there is only one absolute reality which is independent of social construction, Mertens (2005) contended that positivism can be applied to the social world on assumption that the social world can be studied in the same way as the natural world, and that there is a method for studying the social world that is value free, and that explanations of a causal nature can be provided. Mertens (2005) further argued that the assumption is that the social world exists objectively and externally, that knowledge is valid only if it is based on observations of this external reality and that universal or general laws exist or that theoretical models can be developed that are generalizable, can explain cause and effect relationships, and which provide themselves to predicting outcome. However, it must be noted that causality is expected to unfold itself in the natural world which is a closed system than the social world which happens to be an open system. In the social world, variations and continuous changes makes it difficult to experience regular relations between causes and effects (Sayer, 2000). Thus, rendering it difficult to gather facts through predictions and measurements.

Because of the flaws noted by a number of philosophers (Heron, 1996; Weston, 2014), post positivism came into existence as an opposing philosophy to positivism. Some post positivism writers include; Comte, Mill, Durkheim, Newton, and Locke (Smith, 1983), and lately lucid by Phillips and Burbules (2000). The term post

positivism stands for the thinking after positivism, confronting the traditional notion of the absolute truth of knowledge (Phillips and Burbules, 2000) and realising that we cannot be sure about our claims of knowledge when studying the behaviour and actions of humans. Post positivists see the world as unclear, erratic and multiple in its realities and that what might be the truth for one person or cultural group may not be the "truth" for another (O'Leary, 2004).

### *Criticism*

Even though positivists argue for a pure realist's ontology in accessing reality, individual values and beliefs of researchers play a crucial role in accessing the reality. The reason being that values are the guiding reason of human action and that research is most of the times influenced by biasness and cultural influences (Heron, 1996). Weston (2014) noted that no matter how objective a quantitative researcher would be in collecting data, there is always some interpretation by the researchers in the analysis of their data which may introduce some biasness. Other researchers have also contended that it is not possible to control variables when investigating social behaviour in a natural environment (Weston, 2014). It is therefore concluded that, while an absolute reality exist, a researcher only comprehends the reality in an imperfect way (Sayer, 2000). In addition, positivism takes a nomothetic epistemological stance which entails existence of regularities in material and social settings and thus a foundation for explanation and prediction. This regularity makes positivists to believe in the cause and effect phenomena. If two events happen in a series repeatedly, then one is said to explain the other. Conversely, this simple understanding is problematic in the sense that constant conjunction of variables may not be a definite causal explanation of reality as it is simply a theoretical statement about the world and does not answer the question why (Hume, 1966). In line with teaching and learning, positivism regards human behaviour as passive controlled and determined by external environment. This stance forms the basis for 'traditional' styles of teaching which is underpinned by this realist and objectivist views of knowledge (Johnson, 2009). However, this researcher believes learners are not blank slates and that they have something to share. They can share if they are involved in learner centred approaches with the guidance of an educator.

### 3.2.2 Pragmatism

This approach to philosophy came into view from about 1860 in the United States of America (Maxcy, 2003). Its roots are from the work of Peirce, James, Mead, and Dewey (Cherryholmes, 1992). Others who have expounded on pragmatism are Rorty, (1990), Murphy (1990) and Patton (1990). There are several versions of pragmatism, but for many, this worldview arises out of actions, situations, and consequences rather than antecedent conditions (Johnson, Onwuegbuzie and Turner, 2007). There is a concern with applications—what works— and solutions to problems (Patton, 1990). Instead of focusing on methods, researchers emphasize the research problem and use all approaches available to understand the problem (Rossman and Wilson, 1985). Pragmatism in its simplest sense is a practical approach to a problem and has strong associations with mixed methods research (Johnson and Onwuegbuzie, 2004). Pragmatism can be considered a bridge between paradigm and methodology or what Greene and Caracelli (2003) call a stance at the interface between philosophy and methodology. Many mixed methods researchers and theorists draw strong associations with mixed methodology and pragmatism (Greene and Caracelli, 2003; Maxcy, 2003; Tashakkori and Teddlie, 2003; Johnson and Onwuegbuzie, 2004). Patton (2002) stated that the aim of pragmatism is to sensitise researchers and evaluators to methodological biases that accumulate from their own socialisation experiences within their respective discipline areas. He offers a pragmatic approach as a means of promoting methodological appropriateness to enable researchers increase their methodological flexibility and adaptability.

#### *Criticism*

Pragmatism is not concerned with the issues of ontology and epistemology but with applications what works and solutions to problems (Patton, 1990). Researchers emphasize the research problem and use all approaches available to understand the problem. However, this optimism about usefulness is specific and in context as it is a type of shorthand that helps researchers attain their objectives when researching and theorizing (Scot, 2007). It is also true that even if pragmatism divorces itself from matters of ontology and epistemology, all research is never done without perceptions, beliefs, assumptions and the nature of reality. Even before a researcher ventures into a research journey, they will have already made many assumptions about the world

and how they could understand the world. Thus, pragmatism does not and cannot divorce itself from matters of ontology and epistemology.

### **3.2.3 Interpretive**

Interpretive paradigm assumes that realities are constructed and knowledge is fluid and that empirical approaches should be replaced by probing methods that aim to answer how and why questions (methodology) (Kroeze, 2011). Further, Kroeze (2011) argued that realities reside in the human inner beliefs, and are conditional upon human experiences and interpretations. According to this view, reality is seen by multiple people and these multiple people interpret events differently leaving multiple perspectives of an incident (Mack, 2010). Hence access to reality (given or socially constructed) is only through social constructions such as language, knowledge systems, and consciousness and shared meanings (Klein and Myers, 1999; Levy, 2003). Interpretive paradigm is underpinned by observation and interpretation, thus to observe is to collect information about events, while to interpret is to make meaning of that information by drawing inferences or by judging the match between the information and some abstract pattern (Aikenhead, 1997). According to interpretivists, knowledge and meaning is a product of interpretation, hence there is no objective knowledge which is independent of thinking and reasoning humans (Gephart, 1999). Such interpretive thinking does not leave room for identification of dependent and independent variables, but focuses on the full capacity of human sense making as the situation emerges (Myers, 1997; Kaplan and Maxwell, 1994).

Research methodologies such as interviews, focus group discussions and observations that rely on a subjective relationships between the researcher and subjects are basically utilised by interpretivists (Cole, 2006). They endeavour to get their constructs from the field by an in-depth examination of the phenomenon of interest (Easterby-Smith, Thorpe and Jackson, 2008). Additionally, the interpretive paradigm is associated more with methodological approaches that provide an opportunity for the voice, concerns and practices of research participants to be heard (Cole, 2006).

### *Components of Interpretive Paradigm*

The philosophical base of interpretivism is hermeneutics and phenomenology (Boland, 1985). The proponents of hermeneutics are Wilhelm Dilthey and Hans-Georg Gadamer (Klein and Myers, 1999). Hermeneutics can be treated as both an underlying philosophy and a specific mode of analysis (Bleicher, 1980). Bleicher (1980) explained that as a philosophical approach to human understanding, hermeneutics provides the philosophical grounding for interpretivism while as a mode of analysis, it gives a means of understanding the meaning or trying to make sense of written information which may be unclear in one way or another. The basic principle of hermeneutics is that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form (Kafle, 2011). Modern hermeneutics encompasses not only issues involving the written text, but everything in the interpretative process that include verbal and nonverbal forms of communication as well as prior aspects that affect communication, such as presuppositions, and pre-understandings (Wachterhauser, 1986).

The main thinkers of phenomenology on the other hand are Edmund Husserl and Arthur Schultz (Mack, 2010). Phenomenology is an inquiry in which the researcher identifies the essence of human experiences about a phenomenon as described by participants (Kafle, 2011). Understanding the lived experiences marks phenomenology as a philosophy as well as a method, and the procedure involves studying a small number of subjects through extensive and prolonged engagement to develop patterns and relationships of meaning (Moustakas, 1994). In its most basic form, phenomenology attempts to create conditions for the objective study of topics usually regarded as subjective: Consciousness and the content of conscious experiences such as judgments, perceptions and emotions (Mack, 2010).

Table 3.1 displays the characteristics of interpretivism, grouped into the purpose of the research, the nature of reality (ontology), nature of knowledge and the relationship between the inquirer and the inquired-into (epistemology) and methodology.

*Table 3.1: Characteristics of Interpretivist Paradigm*

Element	Description
Purpose of research	Understand, interpret and scrutinize knowledge
Ontology	There are multiple realities due to varying human experience, including people’s knowledge, views, interpretations and experiences.
Epistemology	Access to reality is through social constructions. Reality can be explored, and constructed through human interactions, and meaningful actions.
Methodology	Qualitative with processes of data collection by focus group discussion, interviews and observations

*Source: Cantrell, 2001*

### *Criticism*

Interpretive philosophy denies its followers the opportunity of knowing what is real. They argue for different interpretations of the same phenomenon without a definitive criterion to judge the truth behind these interpretations. Environmental issues like deforestation, famine and pollution are real and exist outside our knowledge and experiences and hence require explicit knowledge of them.

### **3.2.4 Constructivism**

Constructivism has its roots in ancient Greek philosophy (Weston, 2014) and can be traced back to the works of Wilhem Dilthey (1833 - 1911), and Max Weber (1864-1920) (Neuman, 2000). However, Kant expanded these ideas, when he contended that knowledge of the world cannot come from observation alone, but through the lens of human beings’ past experiences (Robinson and Groves, 2000). Constructivism was further developed and popularised by Jacque Derrida (1930-2004), and Michael Foucault (1926-1984), who both had an interest in the use of language, which they perceived as being influenced by social context (Matthews, 2003). Constructivism embraces a relative ontology, a “transactional” epistemology, and a “hermeneutic, dialectical” methodology (Lincoln and Guba, 2000). According to Weston, (2014), transactional epistemology is the negotiated, subjective nature of knowledge, while knowledge is constructed by researchers. She further argues that

the constructivist methodology is based on a variety of methods that are interpreted and investigated to construct knowledge.

Constructionists perceive reality to be a social construct (Saunders, Lewis and Thornhill, 2003). They believe that reality is constructed in the mind of people and that there is no truth without mind. Thus the duty of the researcher is to understand, restructure, analyse and assess participants' views in ways that lead to the construction of meaningful findings (Guba and Lincoln, 1989). Social constructionism hence is "constructing knowledge about reality, not constructing reality itself" (Shadish, 1995:67). The implication of such an understanding is that people construct meaning in different ways despite observing the same phenomenon (Crotty, 1998). In other words, the constructionist paradigm emphasizes how different people in a social system construct their beliefs (Schutt, 2006). It can therefore be construed that in constructivism, the subject and the object are mutually involved in the creation of the meaning (Guba and Lincoln, 1998) whereby culling the objectivists' perspective of knowledge (Crotty, 1998)

#### *Criticism*

Constructivism argues that the mind constructs reality. However, there are biophysical manifestations of nature that exist independent of our knowledge and perception of them e.g. drought. Since this study covers the aspect of learning, like the constructivists' this researcher argues that social interaction, learner centered approaches and contextualized learning are inevitable for learning to occur. However constructivists' belief in pure discovery on the part of learners and educators' as facilitators leaves much to be desired. This researcher believes the educator's role is much more than facilitator's, thus learners need guidance and direction from educators. Lack of direction and instructions from the educator has the potential of making learners feel inept and discouraged. Actually Kirschner, Sweller, and Clark (2006) and Mayer, (2000) have argued that, there is no empirical evidence that support pure discovery. In view of the above, scholars like Mayer (2004), advocates for guided discovery, which is a combination of direct instruction from an educator and hands-on activity.

#### **3.2.5 Critical Realism**

Philosophical debate about what realism is has been on for a long time (Caelli, Ray and Mill 2003; Mkansi and Acheampong, 2012; Morgan and Smircich, 1980).



According to Leplin (1984), realist philosophers hold opposing views about many of the issues and arguments about realism remain unsettled. Philosophic realism in general is the view that entities exist independently of being perceived or independently of our theories about them (Phillips, 1987). Because of disagreements on realism, there are variations to it (Hunt, 2003) and a wide range of terms have been used for such variations. These including “critical” realism (Archer, Bhaskar, Collier, Lawson and Norrie, 1998; Bhaskar, 1989; Campbell, 1988), “experiential” realism (Lakoff, 1987), perspective realism (Giere, 1999), “subtle” realism (Hammersley, 1992a), “emergent” realism (Henry, Julnes, and Mark, 1998), “innocent” realism (Haack, 2003), and “agential” realism (Barad, 2007).

In social sciences, critical realism is associated with the work of Roy Bhaskar (Bhaskar, 1978, 1989; Archer, *et al.*, 1998; Sayer, 1992, 2000). Bhaskar articulated basic critical realism in which he argued for ontological depth and emergence in open systems (Bhaskar 1975; 1989). Bhaskar later extended his work to onto-axiological theory of transformative praxis (now known as Dialectical Critical Realism) (Bhaskar, 1993). This researcher will draw mainly from Basic Critical Realism. The core foundations of Bhaskar’s (1975) basic critical realism is the existence of two dimensions of reality. These are intransitive (empirical) and the transitive (social). He however argued that the conceptualisation of those dimensions of reality is stratified between three domains namely actual, real and empirical. He called this conceptualisation of reality *ontological stratification*. The three domains are shown in table 3.2.

**Table 3.2: Three Levels of Domains in Critical Realism**

	<b>Domain of Real</b>	<b>Domain of actual</b>	<b>Domain of Empirical</b>
<b>Mechanisms</b>	✓		
<b>Events</b>	✓	✓	
<b>Experiences</b>	✓	✓	✓

*Source: Bhaskar (1978)*

Bhaskar argued that the real domain comprises of essential structures, mechanisms, and relations, events and behaviour, and experiences. He added that the generative mechanisms residing in the real domain have the ability of producing events and causing changes in the actual realm that may or may not be experienced directly. The

actual domain is the domain in which observed events or observed patterns of events occur. In Luangwa District for example, small scale farmers may observe natural or human induced drought.

However, the domain of the empirical is closely linked to the real and actual. It consists of what we see; hence it is the domain of experienced events. Happenings in the empirical domain are apparent to us and from these; our senses may inform us about what is happening in the social world (Gerring, 2007; Byrne and Ragin 2009). For example, drought may trigger poor harvests which eventually would affect the social and economic well-being of the small scale farmers of Luangwa District. Some of the events are reflected in chapters 5 and 6 of this document. In addition, from these experiences, environmental knowledge may be conceptualised, abstracted and represented by social groups that interact with the physical world on daily basis and are affected positively or negatively by social, ecological interactions (Sabai, 2014). Abstraction is a process that helps people to delineate boundaries within their perceptions by distinguishing what they see, hear, feel, experience, touch, and envision in different perspectives, and separating what is relevant from what is not (Ollman, 2003). This means that understanding what one means when they use specific concepts is essential and it presents a view of what is found in their thoughts (Puck and Stibbards, 2012). Therefore, researchers must use 'alternative conceptions' models that allow the flow of experience based explanations through which learners make a range of abstractions from natural phenomena as a path that leads to understanding and knowledge (Puck and Stibbards, 2012).

In the context of small scale farmers, experiences may also refer to perceptions on drought and practices concerning drought coping. This may entail fallibility of knowledge and possible errors in perceptions (Sayer, 2000). Thus if a researcher focuses only on these experiences as in interpretive research without considering interacting layers of reality, the findings can be characterised by methodological individualism (Sayer, 2000.) In stratification of ontology, critical realists are thus cautioned to be mindful of the existence of unexercised powers and that existing experiences of what happened or what is known does not exhaust what is likely to happen (Sayer, 2000). Thus, in order to uncover layers of reality, researchers use abstraction and conceptualisation.

Critical realists posit that social phenomena are important but concept dependent and thus need interpretive understanding. Reality can also be seen to be socially constructed whilst underlying structures and mechanisms of the physical world determine social arrangements and understandings (Hughes and Sharrock 1997). Sayer (1992; 2000; 2006), added that for social phenomena, meaning has to be understood, it cannot be measured or counted, and hence there is always an interpretative or hermeneutic element and thus full understanding of any social situation is improbable. However, it is imperative for critical realists to give priority to abstraction and careful conceptualisation when studying the social phenomena because these studies are carried out in open systems hence disregarding these may lead to a conflated or collapsed meaning of reality (Sayer, 2000). The processes of abstraction and conceptualisation are helpful in research processes and also in learning and knowledge production (Danemark, Ekstrom and Jacobsen, 2002). Abstracting as used in this study entails a process of scrutinizing various aspects of the phenomena under investigation, unearthing what they are, what they contain and how they relate to each other (see section 5.3.3). Thus abstraction of social reality may be demonstrated by uncovering causal mechanisms through reinterpretation, with different understandings of causes and tendencies (Kim, 2005). In addition, conceptualisation in this study refers to the process through which individuals specify what they mean when they use particular terms (refer to section 5.3.1.). It can thus be construed that conceptualisation is made through abstraction (Danemark *et al.*, 2000; Hartwig 2007; Sayer, 2000).

Methodologically, critical realists can use qualitative or quantitative as individual approaches or a combination of both (Clark, 2008). Critical realism allows for various research methods, designs and data analysis types capable of collecting information about both the transitive and intransitive dimensions of knowledge (Bergin, Wells and Owen, 2008). Basically the two research designs compatible with critical realism are intensive and extensive research designs (Sayer (1992). Easton (2010) however argues that case study design is particularly suited critical realism. To validate data collected, critical realist relies on internal and external validation. This entails data collection using different research instruments, by different researchers so as to help distinguish among alternative explanations (see section

4.2.7.1). As a result, criticality within a discipline becomes essential since only by seeing the same data through the different theoretical lenses employed by different researchers can help in understanding features of the real world (Woodside and Wilson, 2003; Woodside, Pattinson, and Miller, 2005).

Critical realism has been taken up in many fields including environmental education (Lupele, 2007; Schudel, 2012) geography (Proctor, 1992; Yeung, 1997), religious studies (Robbins, 1999), economics (Lawson, 1997), social work (Houston, 2001), sociology (Sayer, 2000; Layder, 1990), linguistics (Nellhaus, 1998), history (Steinmetz, 1998) and ecology (Trosper, 2005).

#### ***Application of Critical Realism to this Study***

For this study, a more realist (imperfect) ontology combined with an interpretive epistemology was useful. Critical realism is poised to offer this position. Thus the crux of epistemological and ontological consideration informing this study was critical realism. This researcher argues that truth has both the physical and social reality and this is the position that critical realism takes. The use of basic critical realism as the main paradigm informing this research was evident in following:

1. Epistemologically, the nature of environmental learning that formed part of drought coping was interpreted and examined in the context of the competences, practices, values and knowledge of the small scale farmers of Luangwa District (see section 6.3.1).
2. This study also involved an examination of environmental learning for drought coping among small scale farmers of Luangwa district so that its appropriateness is determined. This entailed an assessment of knowledge base, practices, values and competences of both the small scale farmers of Luangwa district and their educators. This necessitated collection of explicit feedback and not as knowledge constructed in the minds of the study community. In achieving this, a realist imperfect ontology was adopted. This helped to establish misconceptions towards drought hazard and it causes (see section 6.3.1 and 6.3.2). This stance also helped to establish the inadequacy nature of environmental learning for drought coping among the small scale farmers of Luangwa District (see section 6.3.4).

3. Epistemologically, critical realism helped this researcher to consider different ‘meanings’ that people assign to language during abstraction, conceptualisation of physical processes and events (refer to section 6.3.1).

Even though this philosophical lense (critical realism) was lucid to this researcher, adoption of an interpretive epistemology meant that subjectivity was unavoidable. However, using different data collection instruments and more than one theory ensured that subjectivity was minimised.

#### *Criticism*

Just like other philosophies, debate against and for critical realism has gained momentum since its inception (Saleh, 2009; Muhammed, 2013). Some of the arguments put forward include failure on the part of critical realists to clarify the basis for critical orientation and the obvious assumption that undesirable features of the operation of social institutions need to change in particular ways (Hammersley, 2009). According to Hammersley (2009), critical realism does not justify the use of the term ‘critical’. He articulated that the phrase ‘critical realism’ and the notion of ‘critical social science’ require that the phenomena being studied, and the societies in which they are found, are subjected to criticism. In response to the above argument, Robson (2002) pointed out that critical realism is ‘critical because it provides a rationale for a critical social science; one that criticizes the social practices that it studies and that critical realists may help people change conditions and build a better world for themselves. Robson (2002) further argued that adopting a critical realist stance not only provides a third way between positivism and interpretivism, but might help fulfil the emancipator potential of social research. In addition, critical realism offers a unified approach to the natural and social sciences while recognising real but different structures and process with the physical, biological and social world (Huckle, 2004).

Having looked at research paradigms, the next section looks at conceptual and theoretical frameworks that informed the study.

### **3.3 Conceptual Framework**

A conceptual framework is a research tool that helps a researcher develop understanding of the situation under investigation and also helps the researcher to

communicate (Kombo and Tromp, 2006). A conceptual framework should be seen as a snapshot of a developing work and as a means of communicating the various elements of any analysis, not a quest to perfectly depict the entirety of the field (Childs, 2010). Some of the functions of a conceptual framework are; to be a tool to scaffold research whereby helping a researcher to make meaning of ensuing findings and the framework materializing into part of the agenda for negotiation to be scrutinised, tested and reviewed (Smyth, 2004).

Conceptual framework can enhance research through:

1. providing a basis from which to interpret and form a coherent whole from further literature. This aspect is illustrated from this study in section 2.2 of this document.
2. enabling the articulation of the findings, as shown in section 5.2.1 of this work.
3. organising the inclusion of any emergent categories as evidenced in section 5.2.2 of this work.

While it is true that there may be gaps in a conceptual framework, having a shot to organise various aspects into a single framework is an important step in identifying those gaps.

### ***Principles Underlying the Construction of a Conceptual Framework for Drought Coping Among Small Scale Farmers of Luangwa District***

Conceptual framework and the literature review were developed in synchrony; one informing the other. Some literature chosen for the study was that which could contribute to the framework by providing definitions or further elaborations of items within the framework. This is exemplified in section 2.2.6 of this document. The framework was then developed and further expanded from these items. Because of the wide ranging nature of the conceptual framework, there is little detail on some of the individual items. Future iterations of the framework could be developed upon these if need be.

Details of how conceptual framework for drought coping was developed and expanded is addressed under rhizomatic knowledge on page 55.

### ***Rhizomatic Knowledge***

The process by which the conceptual framework was expanded through reference to the literature is best described as rhizomatic. The idea of a rhizome as a metaphor for a form of creation of knowledge was introduced by Deleuze and Guattari in '*A Thousand Plateaus (sic)*' (Cormier, 2008). According to Cormier (2008), this metaphor draws attention to the idea of knowledge being formed in a series of nodes developing incrementally and independently, and without a recognisable centre or boundaries. This sets it as different from traditional forms of knowledge, which are divided into defined disciplines with a commonly agreed canon and expert leaders. Drawing upon a multiplicity of knowledge sources from various disciplines rather than sticking to one was of ultimate importance for this study because the study was interdisciplinary in nature. Even though the focus of this study was environmental learning for drought coping, to understand this, several other disciplines were drawn upon. The original sources from which the study began were largely from the field of environmental education. However, drought coping was informed by perspectives from geography, agriculture and hazard mitigation. The nature of learning was informed through environmental education and adult education. As the search across these disciplines expanded, it became possible to identify parallels between them. However, these different perspectives informed each other. Using the rhizome metaphor, these different perspectives became linked nodes.

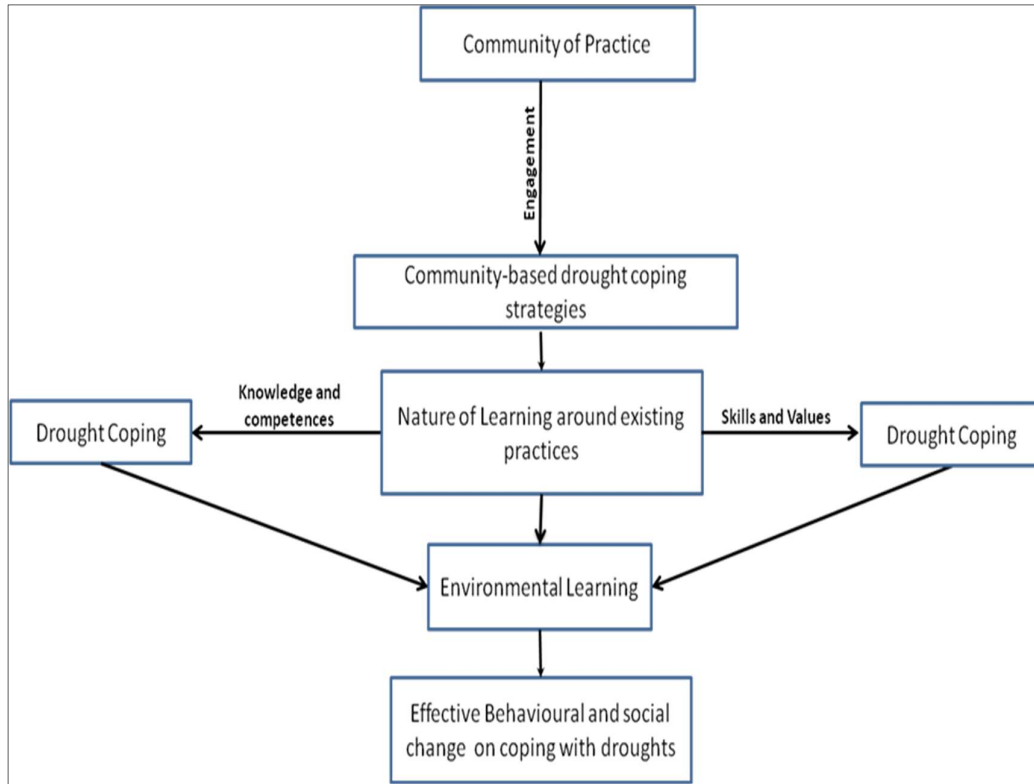
Having explained how conceptual framework for drought coping was developed and expanded, an overview of items that comprised the conceptual framework in question is given below. Moreover, an elucidation of what each component means in the context of this study is also given.

#### **3.3.1 Overview of the Framework**

The conceptual framework comprises six items, which are:

- Community of practice
- Community Based Drought Coping
- Nature of Learning around existing practices
- Environmental Learning
- Behavioural and Social change on Coping with Drought
- Drought Coping

**Figure 3.1: Conceptual Framework for Environmental Learning of Drought Coping**



*(Author's Illustration, 2017)*

The conceptual framework shows the way concepts come into play in as far as environmental learning for drought coping is concerned.

### **3.3.2.1 Environmental Learning**

Environmental learning is about the environment (drought), in the environment (experiential) and for the environment (agency) (see section 2.2.6). In Luangwa District where farming activities are rain fed, drought episodes impede on farming activities and more especially on small scale farmers. Environmental learning could enhance acquisition of effective environmental knowledge, values, skills and competences concerning drought as indicated in section 1.1 of this document. One would expect this kind of learning among the small scale farmers. Thus this study tried to examine environmental learning for drought coping among the small scale farmers of Luangwa District.



### **3.3.1.2 Community of Practice**

Learning is a social and contextual activity as it is associated with the linkage with other human beings and with acquaintances within the surrounding environment (Muchanga, 2013). Thus environmental learning could best be effective if it took place within the community of practice and not as action of an individual acquiring knowledge (Lave and Wenger 1991) (see section 3.4.1). Small scale farmers of Luangwa District are expected to engage in a process of collective learning in a shared domain of human undertaking. They are also expected to share knowledge, skills and values learnt among them themselves. Learning within a community of practice could thus inculcate the competencies needed for drought coping and enhance the highest cultural level of human being's productive activity. Whether the small scale farmers of Luangwa district were engaged in the community of practice was the focus of this study.

### **3.3.1.3 Community Base Drought Coping**

In order to enhance a localised curricula, community based learning could be viable. Small scale farmers as apprentices must engage with the educators (experts) through corroborations and interaction. Since the apprentices (small scale farmers) do not just have an interest but actually practice farming, they must be helped by experts (educators) to make connections between theory and practice on drought coping. This has the potential of making learning relevant to the small scale farmers. As to whether the small scale farmers were able to relate theory to practice on community based drought coping was what this study was trying to find out.

### **3.3.1.4 Nature of Learning Around Existing Practices**

Community based learning means that the nature of learning would be around existing practices. This is important because knowledge must be shared in authentic contexts that would simulate that knowledge (Learning Theories Knowledgebase, 2008b) and also because this kind of learning could be more relevant on drought coping among community of practice. This study intended to establish whether nature of learning among small scale farmers of Luangwa District was around the existing practices.

### **3.3.2.5 Behavioural Societal Change towards Drought Coping**

Having acquired the knowledge, values and skills needed, learners are expected to move from legitimate peripheral participation to full participation (Lave and Wenger 1991). While doing so, they become more active and engage within the culture eventually assuming the role of an expert (educators) (Linehan and McCarthy, 2001) and thus are in a position to help other learners. This may foster behavioural and social change among the small scale farmers on drought coping. Details on members of the community practice moving from periphery to full participation are illuminated in section 3.3.1 of this thesis. This study intended to establish whether there was positive behavioural and social change among small scale farmers towards drought coping.

Having discussed how concepts in conceptual framework came into play in as far as environmental learning for drought coping is concerned, the next section discusses the theoretical framework that informed this study.

## **3.4 Theoretical Framework**

A theoretical framework is a collection of interconnected ideas based on theories (Kombo and Tromp, 2014). It is a supposition that is supported by evidence. A theoretical framework offers an explanation of the existence of a certain phenomenon (Kombo and Tromp, 2014). To accentuate the importance of environmental learning for drought coping, this study was guided by Situated Learning Theory and Structural Functional Theory. This theoretical framework was complemented by the conceptual framework and guided the researcher in addressing the objectives of the study. Situated learning theory addressed objectives two (2) and three (3). Because situated learning theory could not address objective one (1), it became apparent that another theory was needed to address objective one (1). Thus Structural Functional Theory was adopted to address objective one (1). The objectives of this study are epitomized in section 1.4 of this document. A description about each of these theories is given and thereafter, explanations are provided as to how these theories relate to the study.

### **3.4.1 Situated Learning Theory**

Situated learning theory is one of the social constructivist theories developed by Jean

Lave and Etienne Wenger in the early 1990s. Situated learning theory view learning as a sociocultural phenomenon within a community of practice rather than the action of individual acquiring general information from a decontextualized body of knowledge (Lave and Wenger 1991, Kirshner and Whitson, 1997). Learning is basically a process of increasing participation in communities of practice (Lave, 1900). Learning occurs in a very effective manner within communities where deliberations trust building, cooperation, problem solving, understanding and relations within the community of practice could foster community members' wellbeing (Brown, Collins, and Duguid 1989; Lave 1988; Rosenberg, O'Donogue and Olvitt, 2008; Stein, 1998). In addition, knowledge and skills are learned in the contexts that reflect how knowledge is obtained and applied in everyday situations.

Situated learning essentially is a matter of creating meaning from the real activities of daily living (Stein, 1998) where learning occurs relative to the teaching environment. Learning is driven by problems rather than content. Situations are presented that challenge the intellectual and psychomotor skills learners will apply at home, in the community, or the workplace (Lankard, 1995). In their argument, the proponents of situated learning articulated that knowledge must be situated in a relevant or "authentic" side if it has been useful. They further argued that knowledge is to a great degree a product of the activity, context, and culture in which it is used (Lave and Wenger 1991). That is, it cannot be taught in the abstract but in context.

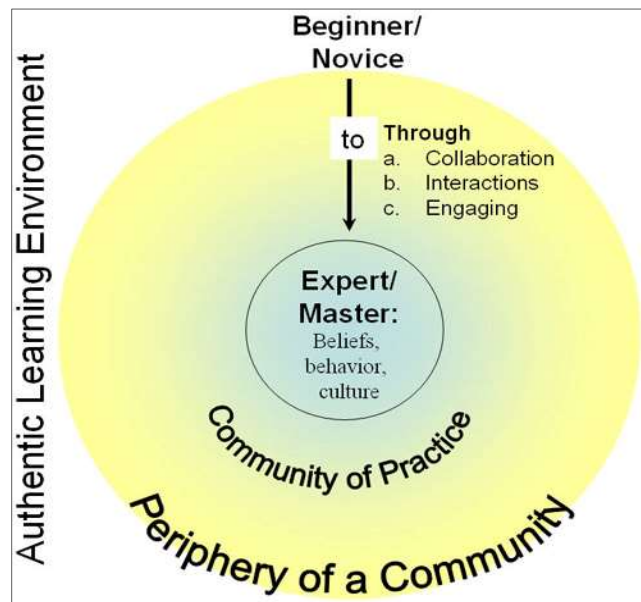
Situated learning encourages students to engage in co-operative activities where they are provoked to use their critical thinking and kinaesthetic abilities. In the end, situated learning experience should encourage students to tap their prior knowledge and to challenge others in their community (Stein, 1998). Situated learning is differentiated from other varieties of experiential learning because it is based on four major guiding principles in the development of learning activities (Anderson, Reder, and Simon 1996). These guiding principle are: (1) learning is rooted in the actions of everyday situations; (2) knowledge is acquired situationally and transfers only to similar situations; (3) learning is the result of a social process encompassing ways of thinking, perceiving, problem solving, and interacting in addition to declarative and procedural knowledge; and (4) learning is not separated from the world of action but

exists in robust, complex, social environments made up of actors, actions, and situations. In situated learning, students learn from different knowledge sources distributed in the environment, e.g. the tools, the peers, themselves, the textbooks, and the teacher (Young, 1993). An educator or practitioner in a specialised area does not simply stand by and watch learners explore and discover, he or she often guides learners, may encourage them to work in groups to think about issues and questions, and support them with encouragement and advice as they tackle problems, adventures, and challenges that are rooted in real life situations (Bilodeau, 2003). Basically, learning occurs when learners interact with each other and the instructor in order to arrive at shared meaning and to make sense of what they are learning (Berge, 1999). An educator creates a context for learning in which learners can become engaged in interesting activities that encourage and facilitate learning. Even with educator's guidance, most learning in situated learning takes place through interactions among and between people often linking previous information with reality. Collaboration and sharing of purposeful, patterned learning activities foster academic maturity of the learners (Lave and Wenger, 1991). Eventually the position of the learner in the learning process changes from being a novice to an expert (Oregon Technology in Education Council, 2007). Furthermore, assessment of learners' progress in situated learning is intrinsic to their participation in on-going practices.

As earlier indicated, community of practice (CoP) is perceived to be a type of learning community (Wenger, McDermott, and Snyder, 2002). Communities of Practice (CoP) are also seen to be groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Learning Theories Knowledgebase, 2008b; Wenger, 2007). Communities of practice are a group of people who engage in a process of collective learning in a shared domain of human undertaking. There are three key elements that distinguish a community of practice from other groups and communities (Wenger, 2007). These includes: domain, community and practice. According to Wenger (2007), the *domain* has to do with a shared competence that distinguishes members from other people. Wenger (2007) further states that the *community* has to do with building relationships that enable members to learn from each other. Finally, *practice* requires members to

develop a shared repertoire of resources for experiences, stories, tools, and ways of addressing recurring problems. Therefore, learning in the community of practice requires learners to participate in communities of practitioners. Mastery of knowledge and skill requires new learners to move toward full participation in the socio-cultural practices of a community (Wenger, 2007). According to Lave and Wenger (1991), learners in a community of practice must come to a point where they move from legitimate peripheral participation to full participation and that legitimate peripheral participation is a way of talking about the relations between novice and expert, and about activities, identities, artefacts, and communities of knowledge and practice. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice (Lave and Wenger 1991). Figure 3.2 shows what happens in a community of practice.

*Figure 3.2: Community of Practice*



*(Source: Wenger, 2007)*

### **Relation of Situated Learning Theory to This Study**

The researcher tried to understand learning drawing on behaviourists and constructivists perspectives. The researcher found both paradigms limited for understanding learning. Behaviourists pay attention to social factors associated with

causal effects neglecting the social and situated nature of learning (Sayer, 2000) while constructivists recognise social learning, they neglect an important aspect of learner / teacher interaction in the learning process. It is against this background that this researcher found Lave and Wengers' situated learning theory appropriate for understanding learning that is deeply rooted in human interactions and relationships. In this study, small scale farmers' learning for drought coping was analysed using the various concepts of situated learning theory. For example, the concept of community of practice provided a lens for understanding the nature of environmental learning for drought coping among the small scale farmers (see section 3.4.1). This is because as pointed out earlier, learning occurs in a very effective manner within communities where there are deliberations, trust building, cooperation and problem solving. This researcher found it appropriate to describe the small scale farmers of Luangwa District as a community of practice seeing they practiced farming and shared a concern on negative impacts of drought on their farming activities. Another concept that provided lenses for examining small scale farmers' learning was 'situated learning' in terms of knowledge, activity and culture (see section 3.4.1). As articulated by situated learning theory, knowledge must be embedded within activity, context and culture. Learning should be rooted in the society and culture which learners comprehend if they are to make connections between theory and the environment (Henning, 2015). Additionally, situated learning theory posits that for learning to occur, there should be social interaction, collaboration and sharing of ideas among the learners. In this respect, situated learning theory helped establish whether there was any social interaction among small scale farmers of Luangwa District that could enable them achieve desired outcomes with regards to environmental learning for drought coping.

Having discussed the relation between situated learning theory and this study, the next discussion looks at the relation between structural function theory and this study.

### **3.4.2 Structural Functional Theory**

Structural functional theory has its origin in the works of Emile Durkheim. Other notable theorists who expanded on this theory include Herbert Spencer and Robert Merton. According to this theory, hazard events are the product of complex social

arrangement. Abstract structures of human society instigate and perpetuate a hazardous situation (Mileti, 1999). According to structuralists, vulnerability of a society and its constructed environment is the root cause of disaster. People's vulnerability to hazards is generated by root causes such as poverty and limited access to power and resources, and is further increased by dynamic pressures *e.g.* urbanization, unemployment, lack of education, and unsafe conditions such as old houses and lack of preparedness (Wisner *et. al.*, 2004). The most vulnerable are those with restricted choices, those whose lives are constrained by vices such as, discrimination, political powerlessness, physical disability, ill health, the absence of legal rights, and other historically grounded practices of domination and marginalization (Bolin and Stanford, 1998). Expounding further on what the structural functional theory holds, Smith (2001), articulates that disaster victims are not to blame for their own misfortunes. They do not necessarily lack adequate perception or engage in irrational, hazard-inducing behaviour, but – especially in the Third World – they have little choice but to locate in unsafe settings where daily survival is the main objective. They lack the time to prepare for emergency action and the resources to recover from disaster. The structuralists say that social, economic and political factors that create vulnerability of communities should be settled to make people safe from hazards.

### **Relation of Structural Functional Theory to This Study**

In this study, small scale farmers' ability to cope with drought was examined using various concepts of structural functional theory outlined earlier. Concepts such as abstract structures of human society and intricate social dynamic pressure helped to establish that poverty, unsafe location and lack of apt education reduced small scale farmers' capacity to cope with drought (see section 3.4.2). According to the theory, drought episodes are a product of intricate social constitute dynamic pressures like poverty, lack of education, lack of development and unsafe locations (Wisner *et. al.*, 2004). Both visible and abstract structures of human society have the potential to propagate a hazardous condition (Mileti, 1999). It therefore follows that being a drought prone area and less developed as compared to the other parts of Lusaka Province, small scale farmers of Luangwa district were much more vulnerable to drought. This vulnerability to drought events could be aggravated by the fact that

small scale farmers of Luangwa district were less educated and might have not been exposed to the right kind of learning. Thus social, economic and political factors that create vulnerability of communities should be settled to make people safe from hazards (Dewin, 2013).

### **3.5 Summary**

This chapter described ontology and epistemology. It also described and discussed various research paradigms used in environmental education and education in general. In particular, it described concepts, theories and paradigms informing this particular study as noted in sections 3.3.1.1, 3.4.1 and 3.4.2.

The next chapter addresses the research methodology and paradigm that informed this study.



## **CHAPTER FOUR**

### **RESEARCH METHODOLOGY**

#### **4.1 Introduction**

This chapter presents the methodology adopted in this study. In the first part, it justifications for choosing a case study as the appropriate research design, semi-structured interviews, focus groups and observation as data collection instruments. Secondly, thematic analysis will be discussed highlighting why it is the most suitable technique for analysing the data for this study. During the final section, issues of validation and ethical consideration will be discussed.

To specify and clarify data sources, this chapter and other chapters utilises the following symbols: P1 –P6 (Small scale farmers) (PA – PE) (Either Agriculture Supervisor, Extension Officer, Town Planner, Disaster Management Research Officer or Panning Officer) and FGD (Focus Group Discussion). Note: For the sake of anonymity of participants in the study, it will not be stated who PA – PE and P1-P6 are whenever reference is made to these symbols.

#### **4.2 Methodology**

Methodology transforms the principles of a particular philosophy into a research language and shows how the world can be explained or studied (Kaplan, 1973; Grix, 2004). Numerous research methods, designs and data analysis types are compatible with critical realism and capable of collecting information about both the transitive and intransitive dimensions of knowledge (Bergin *et al.*, 2008). For this study, the researcher utilised a qualitative approach. The use of qualitative approach was in line with both the nature of this study and paradigm adopted. Clark (2008) indicated that critical realists can use qualitative and quantitative as individual approaches or a combination of both (see section 3.2.5).

##### **4.2.1 Qualitative Approach**

Qualitative research is a naturalistic study that attempts to study the everyday life of different groups of people and communities in their natural setting (Creswell, 2003). Qualitative research is designed to help researchers understand people and social and cultural contexts within which they live (Myers, 2009). Philip (1998) added that

qualitative studies allow the complexities and differences of worlds-under-study to be explored and represented. Qualitative researchers aim to explore and to discover issues about the problem at hand, because very little is known about the problem (Domegan and Fleming, 2007). In the quest to understand the issues about the problem, Joubish, Khurram, Ahmed, Fatima and Haider, 2011) indicate that qualitative researchers do that by building on a complex, holistic picture formed with people's words, actions and records.

In qualitative research, the researcher is both the instrument of qualitative inquiry and interpreter of the results thus the quality of research depends on the researcher's skill, intellect, discipline and creativity (Joubish *et al.*, 2011). Thus different knowledge claims, enquiry strategies, interactive data collection methods and analysis are employed (Creswell, 2003). Qualitative researchers use methods such as observation, interviews and focus group discussion to gather in depth information about the phenomena under study (Myers, 2009) Secondary sources of data includes written descriptions of people, events, opinions, attitudes and environments (Sprinthall, Schmutte, and Surois, 1991). Data analysis commences as soon as data collection starts and continues up until all data is analysed (Joubish *et al.*, 2011; Woods, 2006). In addition, Neuman (2003) explained that reporting of qualitative research comprise direct quotes from research participants. In terms of sample size, qualitative researchers pick on a small sample (Mason, 2010; Wallen and Fraenkiel, 2001) and nonprobability sampling techniques like purposive are usually used (Borg and Gall, 1989). Further, Easterby-Smith, Thorpe and Jackson (2008) and Gray (2004) stated that qualitative research is usually linked to inductive research approach. According to Saunders *et al.*, (2003) inductive approach is a process of building a theory, in which the researcher collects data first and later develops a theory in the light of the collected data. However qualitative approach is not without flaws. As already mentioned, a researcher is both an instrument of inquiry and interpreter which means that bias may not be avoided. Further, the sample size is usually small in qualitative research hence generalization of the findings to other areas may not be fusible. However, the researcher has tried to explain how these issues were addressed in various sections of the methodology chapter.

### ***Rationale for Using Qualitative Approach***

For one to decide to adopt either a quantitative or qualitative approach there should be compelling reasons for their choice (Joubish *et al.*, 2011). Some of the challenges associated with qualitative approach include no universal agreement on the ideal sample size (Carson *et al.*, 2001) deficient in terms of scientific rigour and the findings being merely a collection of personal opinions subject to researcher bias (Rolfe, 2006). Despite the challenges associated with qualitative research, it was used to address the research problem due to the following reasons:

First, qualitative research is useful in the study of educational settings and processes (Denzin and Lincoln, 2003). This assertion is supported by other researchers such as Domegan, and Fleming, (2007), Henning, Van Rensburg, and Smit (2004) and Richardson, (1995). They averred that human learning can best be researched by using qualitative approach. This study is about an examination of environmental learning for drought coping among the small scale farmers of Luangwa District, thus about human learning.

Second, the purpose of the study was to examine environmental learning of drought coping in a natural setting without manipulating the process of learning. The field aspect of qualitative approach allowed the researcher to conduct the study in a natural setting. Critical processes in this study were observing, interviewing and documenting in detail the educational experiences of small scale farmers of Luangwa district on drought coping. Domegan and Fleming (2007), added that when the understanding of phenomena is a function of personal interaction and perception of the study community, and the description of the processes that are typical of the phenomena, qualitative approaches are more appropriate than quantitative designs. The natural setting in this study was operationalized to mean villages, farming fields and community hall (as it exist in Luangwa) where most of the activities took place from.

Third, qualitative approach is flexible (Punch, 2007; Silverman, 2005) and hence flexibility of the approach allowed the researcher to make changes to some interview questions as it was realised that some questions were not clear for the participants. Furthermore, more participants were included in the sample size through snowball

sampling technique. This was so as it was discovered during field work that some of the key informants were left out in initial sample size.

Fourth, the aspects of qualitative approach that allows a researcher to get a deeper understanding of the phenomena under investigation. The main purpose of the study was to examine the nature of environmental learning of drought coping in order to determine its appropriateness. To do so, the researcher first needed to get a detailed understanding of the nature of environmental learning of drought coping before an examination was done. Qualitative approaches thus enhanced an all-inclusive understanding of the nature of environmental learning of drought coping (Joubish *et al.*, 2011)

Lastly, the interactive nature of qualitative approach also motivated this researcher to utilise it. Information on drought coping strategies utilised by small scale farmers and how they learnt those strategies could best be obtained by one to one interaction between the researcher and the participants. Methods used included in-depth interviews, observations and focus group discussions. Sinnes (2005) also confirmed that information on people's views and facial expressions can only be gathered through one to one interaction between participants and researcher. In line with critical realism, qualitative approach was adopted in this study (see section 3.2.5).

#### **4.2.2 Research design**

A research design is an action plan for getting from *here* to *there*, where 'here' may be said to be the initial set of questions to be answered and 'there' is some set of (conclusions) answers (Yin, 2003). It serves as a plan to help structure and execute the research and eventually get answers to research problems (Mouton, 1996; Orodho 2003). It is also thought of as a master plan of a research that constitutes the blueprint for collection, measurement and analysis of data (Kothari, 2003). It gives optimum research guidelines on samples or groups, measures, treatments or programs (Msabila and Nalaila, 2013). A research design gives directions from the underlying philosophical assumptions of research, data collection and data analysis. According to Sayer (1992), the two research designs that are compatible with critical realism are intensive and extensive research designs. He explained that extensive design is employed when the sole purpose of research is to link the theoretical (abstract) to the empirical (concrete). On the other hand, 'intensive research design'

is adopted when researchers want to obtain in-depth knowledge on specific phenomena. Since the purpose of this study is to get in-depth information on the nature of environmental learning for drought coping, intensive design in a form of a case study will be adopted to get comprehensive information on knowledge, competences, values and skills towards drought coping. This in turn will help get in-depth information on the nature of environmental learning for drought coping among small scale farmers of Luangwa District. Easton (2010) added that critical realism is particularly well suited as a companion to case research. He argued that it justifies the study of any situation, regardless of the numbers of research units involved, but only if the process involves thoughtful in depth research. Easton (2010) further argued that intensive research mainly applies to qualitative methods and analysis (refer to section 3.2.5.).

### ***Case Study***

A case study is an exhaustive description and analysis of a particular individual, group or event (Taylor, Sinha and Ghoshal, 2011). It is a way of looking at the object of study as a whole. It can also be defined as a detailed examination of single phenomena (Mitchell, 1983; Hill and Turner, 1984 in Flyvbverg 2006). In case study research, the researcher provides a detailed account of one or more cases (Yin, 1994). Although case study research may rely on qualitative data, multiple methods are also used (Stake, 2005; Yin, 2003). Case study research can be used to address exploratory, descriptive, and explanatory research questions (Stake, 1995; Yin, 1994). Case study research is more varied than phenomenology, which focuses on individuals' experience of some phenomenon; ethnography, which focuses on some aspect of culture; or grounded theory, which focuses on developing an explanatory theory (Christensen and Johnson, 2004).

Case studies are of different types as categorised by different scholars (Bogdan and Biklen, 1982; Stake, 1995; Stenhouse, 1985). A taxonomy of case studies include; intrinsic, instrumental, collective, holistic, embedded, multiple cases, snap case, longitudinal, pre- post case, patchwork case and comparative case ( Msabila and Nalaila 2013;Yin 1994; Jensen and Rodgers quoted in Taylor, Sinha and Ghoshal, 2011).

#### 4.2.2.1 Research Choice: The Case Study in Question

Since there are different types of case studies, Yin's (1994) *single holistic* case study was adopted. The researcher utilised a holistic case study to gather in-depth information about the nature of environmental learning for drought coping among small scale farmers in Luangwa District. The reason being that a holistic case study is best for gaining a deeper understanding of a case (Yin, 2003). A holistic case study helped to capture the knowledge, values, practices and competences for drought coping. The use of a holistic case study not only facilitates an in-depth analysis and logical explanations of the phenomena under investigation, but also helps in yielding qualitative data in one (Yin, 2003). The current case study was done in Luangwa District.

Since a case study allows for multiple sources of data collection (Merriam, 1998), this researcher used multiple sources of evidence such as observations, facial gestures during interviews and written documents to enhance validity of this study. In support of the researcher's stance, Denscombe, (1998) said that a case study allows the researcher to employ numerous sources of data and a wide range of research methods, which in turn foster the validation of data through triangulation. Consequently, findings or conclusions are likely to be more compelling and accurate (Yin, 2003).

Further, Merriam (1998) explained that qualitative case studies in education are often framed with concepts and theories and thus an inductive method is used to support or challenge theoretical assumptions. This is actually very important for the present study because after a detailed understanding of the nature of environmental learning of drought coping, the researcher needed to examine it. McMillan and Schumacher (2001), added that a case study examines a programme, system or a case in detail, employing multiple sources of data found in the setting. Hence, the framework developed in this thesis supports examination of both the educators' and small scale farmers' perspectives. Additionally, since the underlying philosophy of single case study is "not to prove but to improve" (Stufflebeam, Madaus, and Kellaghan, 2000), indeed, this study seeks to improve environmental learning for drought coping. A proposed environmental learning for drought coping might then be applicable to other areas in Zambia and beyond which operate under the same drought conditions.

Conclusively, as interpretive epistemology has been embraced in this study and the nature of the research questions, the researcher is confident that the case study approach is the most viable research design for this study because of its advantages in bringing to light detailed perceptions and concerns of individual participants in a real-world situation which would have been lost in quantitative or experimental designs.

Like other research designs, case studies have been criticised on the grounds of non-representativeness and a lack of statistical generalizability. In addition, Cornford and Smithson (1996) have argued that, the richness and complexity of the data collected means that the data is often open to different interpretations, and potential of researcher bias. On generalization, Seale (1999) advised that this could be achieved by providing a detailed, rich description of the settings studied to provide the reader with sufficient information to be able to judge the applicability of the findings to other settings that they know. In view of the above, a detailed rich description of the study has been provided in chapter four of this thesis so that readers can make their own judgment regarding the transferability of the research outcomes. This issue is further discussed in detail under validation (see section 4.2.7).

On data generated in case studies being open to different interpretations and researcher's bias, throughout the process of this study, the researcher was sensitive to possible biases by being cognisant of the possibilities for multiple interpretations of reality. Hence, this researcher engaged another researcher in the same field of study to collect information on environmental learning for drought coping. Information collected by this researcher and the other researcher was compared to reduce bias. This issue is also further discussed under validation (refer to section 4.2.7).

### **4.2.3 Study Population**

The study population for this study consisted of all individual adults above the age of 19 years. Its composition included educators, learners and policy makers. These included small scale farmers of Luangwa District, agriculture extension officers, disaster management officers, agriculture supervisors, planners and educational programme managers from Child Fund.

#### 4.2.4 Sampling

Being a qualitative research, this study utilised a non-probability sampling design. Non-probability sampling is a sampling design where the process of selecting the sample does not give all the individuals in the population an equal chance of being selected (Mugera, 2013). Selection of the sample is usually on the basis of their accessibility or by the purposive personal judgment of the researcher. Non-probability sampling techniques are viable when a researcher seeks an in-depth study of a small population or when the researcher is carrying out an initial, exploratory study (Schutt, 2006). This study is both explorative and descriptive hence correct to use non-probability sampling. The common non-probability sampling techniques are convenient sampling, quota sampling, purposive sampling and snowball. This research adopted purposive and snowballing techniques.

Purposive sampling, also known as judgmental, selective or subjective sampling, is a type of non-probability sampling technique (Bryman, 2008). Purposive sampling focuses on sampling techniques where the elements that are investigated are based on the judgment of the researcher. Purposive sampling involves the researcher making a conscious decision about which individuals and which research sites would best provide the desired information (Burns and Grove, 2007; DeVaus, 2002). This type of non-probability sampling was chosen in order to provide the researcher with the most useful data upon which to examine the nature of environmental learning and also to help develop an educational package for small scale farmers. A purposive approach is well-suited to small-scale and in-depth studies (Ritchie and Lewis, 2003; Schutt, 2006). Indeed this study was qualitative in nature and required an in-depth study on the nature of environmental learning for drought coping. This was in line with Miles and Huberman (1994) who indicated that, qualitative samples tend to be purposive rather than random due to the fact that the universe is more limited and that mostly qualitative studies examines a single 'case', some phenomenon embedded in a single social setting.

Purpose sampling is of different types each with its own goals. For this study, homogenous and expert sampling were adopted. Similarly, snowball sampling is of different types. It is a referral- sampling of a hidden population or if the sample for the study is rare or limited to a very small subgroup of the population (Castillo, 2009; Palinkas, Horwitz, Green, Wisdom, Duan and Hoagwood, 2013). This study utilized



linear snowball. Because snowball sampling has been criticised on basis that the sample may include an over-representation of individuals with numerous social connections who share similar characteristics (Magnani, Sabin, Saidel and Heckathorn, 2005), the researcher was deeply involved by making sure that the chain of referrals remained within limitations that were relevant to the study.

#### **4.2.4.1 Purposive Sampling Procedures**

##### *Educators and Disaster Management Officers*

Officers from disaster management and extension officer were picked using expert purposive sampling because they possessed expert knowledge on drought prevalence and farmers' learning activities in Luangwa District.

##### *Small Scale Farmers*

Whilst in the field, it was discovered that the Department of Agriculture in Luangwa District had assigned all villages to learning camps. With the help of the department of agriculture Luangwa District, one learning camp was chosen because it comprised villages that were more susceptible to drought episodes than other villages in Luangwa District. It was from camp 3 where the 7 small scale farmers that formed the focus group discussion came from. Selection of those small scale farmers from camp 3 was based on period of stay in Luangwa District of not less than two years. This was important as period of stay indicated some form of experience on drought incidence. Basically, small scale farmers were selected using homogenous sampling because the sample needed to share the same characteristics in terms of their background and occupation to enhance minimal variations in data collected. This was helpful for the purpose of reducing variation in the responses, simplifying analysis, and to make group interviewing easy (Palinkas *et al.*, 2013).

#### **4.2.4.2 Snowball Sampling Procedures**

Before embarking on field work, the researcher was cognisant of the fact that there could be other people who could possess vital information on drought and environmental learning for drought coping apart from the initial identified participants. This meant engaging in snowball sampling. Thus the researcher decided to inquire from the initial participants on other potential participants and any other people who could have valuable information on the research problem. Truly, this led to the discovery of people who had vital information on small scale farmers' learning

activities. The identified informants included; agriculture PB to PD. In line with this researcher's thinking, Neuman (2000) advised that if a researcher needs to choose hidden participants that are well-informed, snowball sampling is useful. The process of how it was done is indicated below.

During an interview with PA, he indicated to the researcher that PB had signification information on drought prevalence and farmers' learning in Luangwa district.

In an interview with a PB, he directed the researcher to PC whom he believed had more substantial information on drought incidences and farmers' learning in Luangwa district.

During an interview with PC, PD was nominated as key stakeholder in conducting learning activities for small scale farmers in Luangwa district.

#### **4.2.4.3 Sample Size**

While there are general guidelines for sample size in quantitative research, there is no such advice that can be given for a qualitative study more importantly with case study (Carson *et al.*, 2001). The final number of participants in the sample is usually determined when the outcome of the interviews becomes repetitive and no new themes emerge - denoted as data saturation (Carson *et al.*, 2001; Glaser and Strauss, 1967; Levy; Strauss and Corbin, 1998). However, Eisenhardt (1989) advised that while there is no superlative number of cases in case study design, a number between 4 and 10 cases normally work out well.

For this research, a total number of 7 small scale farmers were selected and those formed a focus group discussion. PA to PE were interviewed using a semi structured interview guide. Sample of semi structured interview guide is shown in appendix 2.

Data saturation was employed in getting information from the small scale farmers. A total number of 6 small scale farmers from villages such as Katope were interviewed to determine whether there was need to conduct more than 1 focus group discussion. It was discovered that these interviewed gave similar information to what the researcher got from the focus group discussion hence there was no need for more interviews with the small scale farmers. This also allowed the researcher to explore topics that appeared in the analysis of the interviews and hence illuminated areas that seemed to have a point of view without consensus. The researcher chose the above numbers because it was felt that the chosen numbers would facilitate the researcher's

close association with the respondents, and enhance the validity of fine-grained, in-depth inquiry. The number and sampling techniques used in the current study are shown in the table 4.1.

**Table 4.1: Number of Participants and Sampling techniques used in this Case Study**

<b>Participants</b>	<b>No. of Participants</b>	<b>Sampling Design</b>	<b>Sampling Technique</b>
Ministry of Agriculture	2	Purposive and Snowball	Expert and Linear
Ministry of Local Government and Housing	1	Snowball	Linear
Disaster Management Unit	1	Purposive	Expert
Child Fund (NGO)	1	Snowball	Linear
Small Scale Farmers	7	Purposive	Homogenous

#### **4.2.5 Data Collection Tools**

A variety of data collection instruments are available under the case study approach. These include interviews (unstructured, structured and semi-structured), questionnaire, observation, documentation and artefacts (Gillham, 2000). In addition, Yin (1994) identifies six sources of evidence in case studies, which include archival records, interviews, direct observation; participant-observation, and physical artefacts. The nature of this study (qualitative), combined with advice from the authors above guided the selection of the data collection techniques used in this research project. Each of the data collection methods used in this research project could be considered part of an overall approach to improving the quality and validity of the research data.

Since the best way of providing answers for this study’s research questions would be to choose an interview technique that is able to generate rich verbal data, semi structured interview was chosen for this study. Semi structured interviews were complimented by focus group discussion and observations. Secondary data was collected through reading and reviewing different documents related to the subject proposed. Sources included books, articles, journals, reports, and archival documentations (Leedy and Ormord, 2001).

##### **4.2.5.1 Semi Structured Interviews**

Rich verbal data cannot be collected through *structured interviews* (Smith, 2008). This is because respondents have to fit their experiences and feelings into

researchers' set of questions. This has a potential to limit their responses and misrepresent what respondents mean or experience (Christensen and Johnson, 2004). On the other hand, *unstructured interviews* are done without an interview schedule and allow respondents an opportunity to reveal more information in relation to a general area (May, 2001; Willig, 2006). Since the researcher's questions are guided by the respondent's accounts (Moyle, 2002; Cohen and Crabtree, 2006), this technique is not the best for investigations that aim at inquiring on particular areas of a subject. Hence, as a different person's frame of reference directs each unstructured interview (Moyle, 2002), their accounts can pertain to different areas of the same field.

Apart from the small scale farmers, the researcher interviewed every other participant using a semi-structured interview approach to appraise the environmental learning of drought coping. This researcher prepared lead questions beforehand which resulted in other probing questions to arise in the process of interviews. Probe questions depended on the responses participants gave. Most of the questions asked were open-ended in nature. These questions were formulated based on sources such as literature on drought and small scale farmers' learning.

#### *Procedure Done*

During interviews, the first thing that the researcher did was to introduce herself to the interviewee. She did this by stating her name, position, institution and later explained the aim of the research to formalise the interviewee with the research topic. Then she assured them about the confidentiality of the information they were to give. What followed next was a question on interviewees' position and responsibilities in a quest of collecting more detail about him/her and at the same time creating a good rapport between the researcher and the interviewee.

All interviews took about 90 minutes and interviewees demonstrated varied experience on the research topic. To help the researcher reminisce the conversation, all interviews were audio recorded with permission from each participant. In addition, the researcher took notes of the interviewees' responses throughout the interview. All interviews were transcribed and analyzed as shown in the next sections of this chapter.

#### *Rationale for Semi-Structured Interview*

Semi-structured interview guide was selected to be the most suitable means of data collection in this study, because of the reasons highlighted below:

Combining techniques from structured and unstructured interviews, *semi-structured interviews* provide respondents with the freedom to express issues in their own terms, while allowing for comparability between their accounts (May, 2001). Although schedules are developed, the interviews are not dictated by them. As such, interviewers can allow respondents to swerve into unanticipated areas that are relevant to the study and illuminate detailed verbal data (Smith, 2008; May, 2001). In addition, semi-structured interviews were chosen because they allowed for participants to be guided from straying from the subject of interest but gave the opportunity to divulge rich information regarding their beliefs, understandings and experiences in relation to subject matter (Banister, Burman, Parker, Taylor and Tindall, 1994; Mason, 1996; May, 2001; Schostak, 2006).

#### *Criticism*

Like other data collection tools, semi structured interviews have been criticized. Patton (2002) noted that the quality of data gathered from semi structured interviews is to a larger extent determined by the emotional state of the interviewee, hence a possible distortion to data may occur as a result of the interviewee being fretful or upset at the time of the interview. The researcher was mindful of this fact thus probed and encouraged the interviewee to diverge only into areas that were relevant to the study.

#### **4.2.5.2 Focus Group Discussion**

Focus Group discussion is an in-depth interview conducted in a group, whose focus or object of analysis is the interaction inside the group (Freitas, Olivera, Jenkins and Popjoy 1998). Focus group has an advantage of depth and complexity of response because group discussion usually fuels new thoughts, which might not have otherwise ensued in other methods of data collection (Dzija, Foster, Hernandez, Naidi, Theriault and Wynne 2005). Focus groups can be used as the sole source of data or as a complement to another research method (Freitas *et al.*, 1998).

#### *Rationale for Focus Group*

One of the main reasons for conducting focus group discussions is to learn more about peoples' opinions on a chosen topic with the view that information gathered,

would guide further action (Dzija *et al.*, 2005). Certainly, the current study aimed at examining environmental learning for drought coping with the view of proposing an improved version of it. Moreover, focused group discussions accompanied by note taking and authorized voice recording helped to gather in-depth information and also complemented semi structured interviews. The purpose was to gather information on drought coping strategies and the nature of learning for drought coping in a group environment, whereby by allowing for discussion and interaction by the small scale farmers. An example of focus discussion transcription is shown in appendix 3.

#### *Procedure Done*

Preparation of conducting a focus group discussion involved a lot of planning. It involved selection of site, participants and equipment. How the site and participants were selected is discussed under sample size and study area. A focus group interview guide was prepared beforehand which included engaging, follow up and exit questions. Engaging questions assisted the researcher to introduce the topic of discussion to the participants and also to create an atmosphere where they would share their opinions freely. Follow up questions delved into drought coping strategies and the nature of environmental learning for drought coping. Finally, exit questions helped to ensure that the researcher didn't miss out any important opinion that needed to be brought out during the discussion. In addition, many of the small scale farmers didn't understand English language. This was addressed by engaging a competent interpreter who had lived in Luangwa District for 20 years and had reached tertiary level of education. He spoke and understood both English and Nyanja languages.

Homogenous groups of both males and females were chosen for a discussion. Maughan (2003) suggested that an ideal focus group should range from six to twelve subjects. Thus focus group discussion in question comprised 7 members. A homogenous group was chosen so as to level the playing field and reduce on reticence that may occur in a heterogeneous group. The first thing the researcher did when she met the participants for the actual discussion was to introduce myself and her research assistant to the focus group. She did this by stating the names and institution where she and the assistant came from. The researcher later explained the context of the focus group, what a focus group is and how it was going to flow. She

further, assured the participants about confidentiality and explained the use of the information they would share. After discussion the participants were thanked.

The discussion took about 90 minutes. The Researcher asked questions and further, moderated the responses from the group. The members of the focus group shared a lot on their experiences and opinions on drought coping and environmental learning for drought coping. Approximately, 98 per cent of them were actively involved in the discussion. To help the researcher reminisce the discussion, she asked the participants for permission to record the discussion and to take pictures. The use of a audio recorder and hand-written notes was employed throughout the discussion. Since the researcher moderated the discussion, the research assistant also took notes so that no relevant data was missed. The voice recordings and notes were used in the analysis stage.

Consistent with critical realism (refer to section 3.2.5), the researcher treated some of the verbal reflection of transitive dimension of knowledge (Bergin *et al.*, 2008; Dobson, 2002; Wilson and McCormack, 2006) (drunkenness as negative impact of drought) and others as reflection of intransitive knowledge (vulnerability due to socio economic status of small scale farmers) (see section 3.2.5).

#### *Criticism*

Like any other method of data collection, group discussion has been criticized on grounds that some shy participants may not air out their opinions (Dzija, *et al.*, 2005). Indeed 2 per cent of the participants didn't engage themselves in the discussion. However, the researcher encouraged the 2 per cent to be actively involved, by directing certain issues of discussion at them. This is supported by (Freitas *et al.*, 1998; May 2001) who states that even shy members of a focus group need encouragement to converse between themselves if the researcher is to glean the needed information. Moreover, it was important for the researcher to get everyone involved as this determined the success of a focus group discussion. This argument is congruent with Morgan (1988), who affirmed that a test to confirm success of focus group discussion includes how active and easily the participants discussed the topic of interest. Figure 4.1 shows a focus group discussion conducted with the small scale farmers of Luangwa District.

*Figure 4.1: Focus Group Discussion with Small Scale Farmers*



#### **4.2.5.3 Direct Observation**

Direct observation entails that the observer watches events directly. Direct observation is a valued method of data collection in a case study setting (Gillham, 2000; Jankowicz, 2000; Powell, 1997; Yin, 1994). It provides researchers with ways of checking for nonverbal expression of feelings, determine who interacts with whom, grasp how participants communicate with each other, and check for how much time is spent on various activities (Schmuck, 1997). There a number of direct observation types from which a researcher can choose from. These include; complete participant ((Spradley, 1980; Adler and Adler, 1994), complete observer (Pearsall, 1970), participant as observer (Adler and Adler, 1994) and observer as participant (Gold, 1958; Pearsall, 1970). For this study, observer as participant was adopted because, different from the hidden identity that is typical of the complete observer, here the researcher's identity becomes obvious to the study group. This helps the researcher not abrogate ethical issues and also to focus more on the role of the researcher whereby gathering the needed information in details.

#### *Procedure*

Observation can actually be guided by a set of questions that a researcher hopes to answer (Thomas, 2003). This study utilised a semi structured observation guide to allow the researcher to focus on areas that were relevant to the investigation. An observation guide is presented in appendix 4. Observation took place in two ways. First, observations made during one to one interaction between the participants and researcher. Facial expressions and other gestures were taken note of. Categorically,



first observations were done during interviews and during a focus group discussion. Thus, data collection through other sources such as focus group discussions and interviews creates an opportunity to make direct observation (Yin, 2003). Second, tours to farming fields were done so as to observe farming activities and how small farmers engaged in farming activities scale. This assisted the researcher in undertaking a walk-through direct observation for the present study. Small scale farmers gave the researcher permission to take pictures and to do tours of their farming fields. Taking more than one tour was done to enable the researcher observe farming practices of small scale farmers in the natural environment. This was done to triangulate findings from focus group discussion and interviews. Observations were also done so as to add depth and multiplicity to the data gathered. Photographs taken during the observation were helpful in stressing features that would otherwise be missed with the other data collection method used. During observation, the researcher noticed traditional coping strategies as main coping strategies used by small scale farmers of Luangwa District. Detailed Findings are presented in section 5.2.

#### *Criticism*

Conversely, direct observation method also has some limitations such as the distortion of the observation, because the method only focuses on external behaviour meaning that the observer cannot explore people's feelings and perspectives (Patton, 2002). However, this was complimented for by methods that elicited participant's feelings and perspectives. Method employed in the current study that elicited for people's feelings and perspectives were interviews and focus group discussion.

#### **4.2.5.4 Document Analysis**

This method was very important to investigate the case study from different angles (e.g. through secondary sources). A range of documents were used to corroborate the evidence obtained through the focus group, observation and interviews. Some of the documents include:

1. Luangwa District Reports
2. Vulnerability Assessment Reports
3. Zambia National Development Plan -2015

Having presented the approach to data collection, attention can now be turned to how data was analysed.

#### **4.2.6 Data Analysis**

Qualitative analytic methods of data analysis are broadly divided into two groups. First those that are tied to particular theoretical or epistemological position such as conversation analysis (Hutchby and Wooffitt, 1998) and interpretative phenomenological analysis (Smith and Osborn, 2003), grounded theory (Glaser, 1992; Strauss and Corbin, 1998) discourse analysis (Burman and Parker, 1993; Potter and Wetherell, 1987; Willig, 2003) and narrative analysis (Murray, 2003; Riessman, 1993). Second those that are independent of theory and epistemology, and can be applied across a range of theoretical and epistemological approaches e.g. thematic analysis.

However, Ryan and Bernard (2000) situated thematic coding as a process carried out within major analytic traditions such as grounded theory, rather than a specific approach in its own right. In response to this argument, Willig, (1999), argued that thematic analysis should be considered a method in its own right. The researcher took Willig (1999) argument that thematic analysis must be considered a method on its own. Thus, thematic analysis was adopted in this study. Thematic analysis falls under the type of data analysis that is not tied to any theoretical or epistemological positions (Boyatzis, 1998). Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data (Braun and Clarke, 2006). The process engrosses identification of themes through careful reading and re-reading of the data (Rice and Ezzy, 1999). It is a form of pattern identification within the data, where emerging themes become the grouping for analysis (Tobin and Begley, 2004). Thematic analysis goes further by interpreting different aspects of the research topic (Boyatzis, 1998).

#### ***Rationale for the Choice***

Thematic analysis was chosen for this study because of its theoretical and epistemological freedom and its potential to provide a rich and detailed, yet complex account of data. Since thematic analysis can be an essentialist or realist method, which reports experiences, meanings and the reality of participants (Fereday and Cochrane, 2006) it marries well with critical realism (Willig, 1999) a philosophical landscape behind this study. Thematic analysis works both to reflect reality, and to

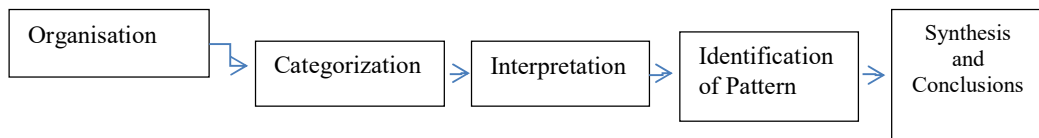
unpick or unravel the surface of reality (Rice and Ezzy, 1999) and this reflects ontological and epistemological stance of critical realism (refer to section 3.2.5).

*Procedure*

Qualitative data analysis starts during the data collection stage (Creswell, 2003; Silverman 1993). Based on this advice data analysis in this study took place simultaneously with data collection. As soon as first data was collected through an interview, the researcher started data analysis and continued until all data was collected. First, the interviews both individual and focus group, were recorded and transcribed. Second, results of transcription of the focus group, results from observations and interviews were arranged in a logical order. Third, individual responses and results from observations were compared and categorised with the results of transcription of the focus group. The recorded and transcribed responses were useful in creating codes and bringing out emerging themes qualitatively. Fourth, the themes were analysed, compared and categorised and subsequently triangulated and interpreted to draw conclusions.

The process of analysis is shown in figure 4.2 below.

**Figure 4.2: Process of Data Analysis**



The methods are listed with the corresponding research approach and the data types are shown in table 4.1.

**Table 4.2: Summary of the research methods**

Method	Instrument	Data Type	Approach
In-depth Interviews	Semi Structured Interview	Qualitative	Interpretive (emergent findings)
Focus Group Discussion	Focus Group Discussion Question Guide	Qualitative	Interpretive (emergent findings)
Observation	Observation Guide	Qualitative	Interpretive (emergent findings)

**4.2.7 Validation and Trustworthiness**

Since this study took a qualitative approach, an account of how data was validated from a qualitative point of view is given. Further, another description of how data

was validated from a critical realist point of view is provided. Providing a critical realist account was also important because the philosophical landscape of the study was critical realism.

#### **4.2.7.1 Validity for Qualitative Study**

Validity and reliability must be addressed in all studies. However, validity and reliability in qualitative research is often questioned by positivists, because their concepts of validity and reliability cannot be handled in the same way as in naturalistic work (Golafshani, 2003). However, Silverman (1993) has shown how qualitative researchers can embrace validity and reliability in qualitative studies.

Many naturalistic investigators have opted to use different terms to mean validity and reliability (Davie and Dodd, 2000; Lincoln and Guba, 1985; Mishler, 2000). One such term is trustworthiness an equivalent term used in qualitative research as a measure of the quality of research (Lincoln and Guba, 1985). It is the extent to which the data and data analysis are believable and trustworthy (Simon, 2011). Possible strategies and criteria are at hand to enhance the trustworthiness of qualitative research findings (Creswell, 1998). These are credibility, transferability, dependability and conformability. They are constructed parallel to the corresponding quantitative criteria of internal and external validity, reliability and neutrality (Creswell, 1998; Guba and Lincoln, 1985; Krefting, 1991) and each strategy in turn uses criteria like reflexivity, triangulation and dense descriptions. The Researcher takes cognisance of this argument and prefers to use the term trustworthiness as it is used by several others to cover all these.

#### ***Credibility***

Internal validity is one key criterion that positivist researchers use to ensure that their study measures what it is intended for. The qualitative investigator's equivalent concept, credibility, deals with the question, 'how harmonious are the findings with reality'? (Merriam, 1998). According to Lincoln and Guba (1985), ensuring credibility is one of most important factors in establishing trustworthiness. One of the provisions that can promote confidence that the phenomena under scrutiny has accurately been recorded is the adoption of research methods and methods of data analysis well established both in qualitative investigation in general (Guba and Lincoln, 1985). Merriam (1998) outlined some strategies that can enhance internal

validity in qualitative research. These are: Triangulation, member checks, clarifying the researcher's biases, assumptions, worldview and theoretical orientation at the outset of the study. These and many more not listed here were addressed in this study as follows:

### *Triangulation*

Triangulations are a method used by qualitative researchers to plaid and establish validity in their naturalistic studies (Guion, 2002). It is the application and combination of several research methodologies in one study (Schneider, Elliott, Lo-Biondo-Wood, and Haber, 2003; Taylor, Kermode, and Roberts, 2007). The use of a combination of methods enhances consistency and accuracy of data by providing a more comprehensive picture of the phenomenon (Roberts and Taylor, 2002; Halcomb and Andrew, 2005; Williams, Rittman, Boylstein, Faircloth, and Haijing, 2005; Jones and Bugge, 2006). Multiple data sources and methods to cross-check and validate findings increase the depth and quality of the results (Halcomb and Andrew, 2005). Triangulation also provides in-depth data, increases the confidence in the research results as well as enables different dimensions of the problem to be considered (Barbour, 2001; Jones and Bugge, 2006). The use of triangulation in this study ensured that data collected was trustworthy (Thurmond, 2001). In this study, the researcher employed data triangulation, methodological, investigator, theory and member check or mirror data.

### *Data Triangulation*

Data triangulation is the use of multiple sources of data in the hope of getting views about asituation in a single study (Roberts and Taylor, 2002). Multiple data sources help validate the findings by exploring diverse views of the situation under investigation (Taylor, Kermode, and Roberts, 2007). It is expected that data will remain the same in different contexts (Denzin, 1984). Data triangulation can be divided into categories of time, space, and person (Roberts and Taylor). Time triangulation involves researchers collecting data at different points in time such as time of day, different days of the week, or at different months of the year (Speziale and Carpenter, 2006). In this study, however, the goal was not to compare participant knowledge between shifts of time. Instead, the researcher was interested in examining environmental learning. Therefore, for this study, only two types of data triangulation were employed: space and person. Space triangulation is the collection

of data from several sites (Roberts and Taylor, 2002). In this study, for example, data was collected from participants who came from six villages. Analysis from those villages helped examine the nature of environmental learning in this research and also increased the validity and strengthened the study (Begley, 1996; Halcomb and Andrew, 2005).

Person triangulation involves gathering data from more than one category of person (Roberts and Taylor, 2002; Taylor, Kermode, and Roberts, 2007). In this study, participants included small scale farmers, officer from Disaster Management Unit, Extension Officer, Agriculture Supervisor, Planner and educator from an NGO. Information from all participants and published material provided greater insight into how small scale farmers learn drought coping strategies and the nature of environmental learning for drought coping. Such data was utilised to support and validate this study.

#### *Methodological Triangulation*

Methodological triangulation is the use of two or more research methods in one study at the level of data collection or design (Taylor, Kermode, and Roberts, 2007). One could use strategies from qualitative or quantitative methods and still triangulate. On the other hand, one could use across-method triangulation involving qualitative and quantitative methods. If the findings from all used methods draw the same or similar conclusions, then validity in the findings has been established (Guion, 2002). Methodological triangulation has subtypes of triangulation namely, within-method triangulation and between method of triangulation. Within-method involves the use of a combination of varieties of the same method. For example, a researcher can do unstructured interviews and semi structured interview guides to collect data. Between methods triangulation, involves the use of different methods in combination (Denzin, 1970). For example the use of interviews and focus group discussion in a study. The preferred one in this research was the between method triangulation. In this study, interviews were utilised to reinforce focus group discussion, observations and secondary sources of data. Thus making a more valid contribution to knowledge development, enhancing diversity, and enriching the understanding surrounding the study's objectives and goals (Schneider, Elliott, LoBiondo-Wood and Haber, 2003; Macnee and McCabe, 2008).

### *Investigator Triangulation*

This is when several investigators examine the same phenomena (Denzin, 1970). Investigators would consist colleagues within the same field of study. To triangulate, each different investigator would study the phenomena using the same qualitative method or same quantitative methods. A comparison of findings from each investigator would then be made (Ndanu and Syombua, 2015). If case findings from the different investigators are the same, validity would be established. If there is discrepancy in the conclusions, then further study would be warranted to discover the true and certain finding (Denzin, 1978). The ability to confirm findings across investigators without prior discussion or collaboration between them can significantly enhance the trustworthiness of the findings. For this study, a phenomenon under study was also examined by another colleague within the research community.

### *Theory Triangulation*

Theory triangulation involves using more than one theoretical perspective to interpret the study phenomenon (Ndanu and Syombua, 2015). The thinking behind theory triangulation is to look at a phenomenon from different perspectives, through different lenses, with different questions in mind (Denzin, 1978). The different theories or hypotheses do not have to be similar or compatible; in fact, the more divergent they are, the more likely they are to identify different issues and/or concerns (Denzin, 1970). In this study two different theories were used to help understand drought hazard and environmental learning for drought coping. Structural function theory was used to understand drought coping while situated learning theory was helpful in understanding the nature and process of learning for drought coping.

### *Member Check or Mirror Data*

The epistemological assumptions of this study were that researchers can access reality through empirical means and also through interpreting social reality (see section 3.2.5). Thus, from an interpretive perspective, bias may influence researcher's interpretations of reality. Therefore, the inclusion of member checking into the findings was one method of increasing credibility. Although it has its own disadvantages, Lincoln and Guba (1985) consider member checking into the findings as "the most critical technique for establishing credibility. Credibility in this study was to be enhanced by taking back some processed data to the respondent as 'mirror

data' for their reflective validation of conclusions that derived from the data. *Mirror Data* triangulation is a validation technique in which part or whole of the processed data from the field is taken back to that same field it was originally sourced, in order to have it screened by research participants who confirm whether or not it reflects information in a way that preserves much of its original quality after undergoing analytical processing (Lotz-Sisitka, 2011). This was achieved through organizing information-sharing discussions with stakeholders who provided data related to the study. For stakeholders who could not be accessed easily, information was sent to them electronically and feedback was received from them electronically.

### ***Transferability***

Research findings are transferable or generalizable only if they fit into new contexts outside the actual study context. Transferability is equivalent to external validity, which is the degree to which findings can be generalized. It designates the extent to which one can extend the account of a particular situation or population to other persons, times or settings than those directly studied (Maxwell, 2002). Transferability is considered a major challenge in qualitative studies partly due to no fast rules in terms of sample size. Sample size in qualitative studies is not a big deal if a researcher is able to get the needed information on the study phenomena. However, transferability in qualitative studies can be enhanced by detailing the research methods, contexts, and assumptions underlying the study. Further, transferability can be realized by providing a detailed, rich description of the settings studied to provide the reader with sufficient information to be able to judge the applicability of the findings to other settings that they know (Seale, 1999). It also important that the researcher documents and justifies the methodological approach, and describes, in detail, the critical processes and procedures that have helped him to construct, shape and connect meanings associated with those phenomena.

Since this study adopted a single case study approach, the process of generalisation that aptly matched it was “inferential generalisation” which is best explained as generalising from the context of the research study itself to other settings or contexts (Ritchie and Lewis, 2003). The researcher tried to provide a rich, description of the study so that data and description would speak for themselves to enable readers appraise the significance of the meanings attached to the findings and make their own judgment regarding the transferability of the research



outcomes. The thesis provided a detailed description of coping strategies and environmental learning for drought coping in order to assist readers interested in making use of the study outcome in other situations. Further, throughout the process of this study, the researcher was sensitive to possible biases by being conscious of interpretations of reality.

Thus for this study, the generalizability issue has to be resolved by the reader of the research report based on how close the researcher's and the reader's contexts are. As argued by Ritchie and Lewis (2003), it will be a matter of judgement of the context and phenomena to be found which will allow others to assess the transferability of the findings to another setting (Ritchie and Lewis, 2003).

### ***Dependability***

Dependability is analogous to reliability, that is, the consistency of observing the same finding under similar circumstances. Dependability concern is that, the manner in which a study is conducted should be consistent across time, researchers, and analysis techniques (Gasson, 2004). Reliability is irrelevant (Stenbacka, 2001) in qualitative studies because these studies focus on human behaviour. It is further compounded by the possibility of multiple interpretations of reality by the study subjects; a similar study with different subjects or in a different institution with different organisational culture and context or by a different researcher may not necessarily yield the same results. The quality of inferences also depends on the personal construction of meanings based on individual experience of the researcher and how skilled the researcher is at gathering the data and interpreting them. As a result of all these, reliability in the traditional sense is not practical in a qualitative case study. Merriam (1998) suggests that reliability in this type of research should be determined by whether the results are consistent with the data collected.

However, Seale (1999) argued that dependability can be achieved in qualitative studies through auditing. He suggested that auditing must include researcher's documentation of data, methods and decisions made during a thesis as well as its end products. He indicated that auditing for dependability demands that the data and descriptions of the research should be elaborate and rich. Further, Seale argued that if need be, it may also be enhanced by altering the research design as new findings emerge during data collection. All these have been addressed under methodology chapter.

### ***Confirmability of the Findings***

Confirmability is the extent to which the research findings can be confirmed or corroborated by others. It is analogous to objectivity, that is, the degree to which a researcher is aware of or accounts for individual subjectivity or bias. Seale (1999) argued that auditing could also be used to establish confirmability in which the researcher makes the provision of a methodological self-critical account of how the research was done. In order to make auditing possible by other researchers, it is a good idea that the researcher archives all collected data in a well-organised, retrievable form so that it can be made available to them if the findings are challenged. This has been addressed under methodology chapter.

Apart from the way data is collected, trustworthiness is a major consideration in instrument development and indicates the extent to which the instrument measures what it claims to measure (DeVaus, 2002). The three basic ways in which to assess the trustworthiness of an instrument is; criterion, content and construct validity. To justify the choice for content validity, the other two basic ways are also discussed.

The criterion validity approach compares the new tool to an existing well-accepted instrument that measures the same concept (DeVaus; Schneider, et al., 2003). Since this was a qualitative study and it was almost impossible to find another instrument that captured all things that the researcher looked for, this approach could not be used to assess the meticulousness of the instruments.

Another type of validity that required discussions was construct validity. Construct validity refers to the extent in which the instrument measures a theoretical trait (DeVaus, 2002). This type of validity is difficult to achieve (Schneider, *et al.*, 2003) and was not used in this study.

Content validity is the ability of the instrument's items to represent the content of the given construct (DeVaus, 2002; Schneider, *et al.*, 2003). When the researcher was developing the instrument, the concern was whether the contents of the research instruments were representative of general knowledge on drought coping and environmental learning which was what the researcher intended to research on. To tackle the issues of content validity, the researcher approached drought researchers and environmental educators to examine the data collection instruments content. Comments on items and their relevance were clarified and modified according to the

comments from the reviewers. Minor modifications to the layout and wording were made prior to its use in the study.

Further, a pilot study was conducted. Two experienced small scale farmers were interviewed. Two weeks after first interview, 2 more small scale farmers and 2 officers from Disaster Management Unit and Ministry of Agriculture were interviewed. A mini focus group discussion could not be organised because most small scale farmers were busy with farming activities hence that was supplemented by testing focus group interview guide on two small scale farmers. The pilot study took place in Luangwa District. Minor adjustments were made to wording. Owing to what was done, the researcher was confident that the instruments were trustworthy.

#### **4.2.7.2 Validity from Critical Realist Perspective**

Maxwell (1992, 2012) looked at validity in terms of procedures as not the only way to validate research findings. Maxwell thus proposed imperfect realist conception of validation as a substitute (Lupele, 2007). Maxwell's (1992, 2012), view of validity draws on critical realism that possibilities are there that researchers may not have direct knowledge of objects of our account thus no independent entity to which to equate these account to. He argued that the notion of validity is not dependent on the existence of reality to which an account can be compared, but depends on the fact there exist ways of assessing accounts that do not depend on features of the account itself. Maxwell identified five categories of validity in critical realism account. These are:

1. evaluative validity
2. descriptive validity
3. interpretive validity
4. generability validity
5. theoretical validity

Generability and theoretical validation are already covered in the previous section. Evaluative validation does not apply to qualitative data and hence this section draws on descriptive and interpretive validity because these are useful in assessing qualitative account.

#### **Interpretive and Descriptive Validity**

Validity in qualitative studies is also seen to be the relationship between evidence

and interpretation (Adler, 1996). This means that interpretations made by the researcher must be supported by evidence. According to Maxwell (1992), interpretative and descriptive forms are the two types of validity in qualitative studies. Interpretive demands accuracy in interpretation of facts found while descriptive requires accuracy in reporting facts (Maxwell, 1992). These two forms of validity could be realized through transcriptions and interpretations. To ensure careful transcriptions in this study, recorded interviews were typed. Thus every word spoken by the small scale farmers and their educators was transcribed without alterations. Thoughtful interpretations were ensured by themes that were recognisable and remained close to the data. According to Maxwell (1992), theoretical and explanatory is achieved by establishing a systematic link between theoretical concepts and the theoretical framework of the study. Thus, theoretical validity was achieved by using theoretical concepts and terms which were coherent with the theoretical framework of the study and these are detailed in chapter four.

#### **4.2.8 Ethical Considerations**

In qualitative research, the researcher is expected to have close interaction with the participants whereby entering the private spaces of these participants (Silverman, 2000). This raises several ethical issues that should be addressed during, and after the research has been conducted. Otherwise the research risks being unethical in its design, questions, methods, analysis, presentation and findings (Nalube, 2014). Thus the researcher must concern him/her with moral integrity to ensure that the research process and findings are trustworthy and valid (Biber, 2005). According to Creswell (2003), researchers are obliged to respect the rights, needs, values and desires of the informants. Thus, several ethical issues should be considered during and after research. According to Miles and Huberman (1994), some of the ethical issues that should be considered in research include:

1. informed consent (Do participants have full knowledge of what is involved?)
2. harm and risk (Can the study hurt participants?)
3. privacy, confidentiality, and anonymity (Will the study intrudes too much into group behaviours?)
4. intervention and advocacy (What should researchers do if participants display harmful or illegal behaviour?)

Drawing on Miles and Huberman (1994), the following section describes how ethical issues were addressed in this study:

#### 1. Informed Consent

Before going into field research, the researcher applied for ethics clearance and scrutiny from the Ethics Committee of the University of Zambia, School of Humanities. Based on recommendations that the study was ethical, authority was granted for the study to be conducted. Consent was also sought from Assistant Dean Postgraduate (School of Education) and District Commissioner (Luangwa District) for the researcher to enter the research site and conduct the study.

A letter of consent for the participants was presented to participants so as to give them freedom to decide whether to participate in the study or not. The researcher apprised the participants of the purpose, nature, and data collection methods. For the sake of participants who were not conversant with English Language, interviews were conducted in Nyanja Language as this helped in obtaining the most crude and rich data, and allowed participants to express themselves confidently. All photographing was done with permission from the people photographed, and the use of the photos was clearly explained to them. See appendix 7 for a copy of the actual consent letters that the participants signed and appendix 6 a copy of clearance letter from the Ethics Committee of the University of Zambia.

#### 2. Harm and risk

In this research study, the researcher did not put participants in any situation where they were exposed to harm as a result of their participation.

#### 3. Privacy, Confidentiality, and Anonymity

The researcher ensured that the confidentiality and anonymity of the participants was maintained through the removal of identifying characteristics before widespread dissemination of information. The researcher also made sure that the participants' names were not be used for any other purposes, nor any information shared that would reveal their identity in any way. Further, the participants were informed that raw data which contain their identifying characteristics would be stored in a locked cabinet and would be destroyed when no longer required.

#### 4. Voluntary Participation

It was made clear to the participants that the research was for academic purpose and

that their participation was absolutely on voluntary basis. All participants took part in the study on voluntary basis as none of them was forced to participate.

#### **4.2.9 Limitations**

Because of the nature of the study, subjectivity was unavoidable and therefore might have affected the results. However, triangulation, interpretive validation and descriptive validation ensured the trustworthiness and validity of the results.

Further, translated data from Nyanja to English language might have compromised some original meanings of themes. However, extra care was exercised by engaging a competent interpreter and by the use of post data analysis validation through mirror data.

#### **4.2.10 Summary**

This chapter outlined the research paradigm, research methodologies, strategies and design used in the study, including procedures, participants, data collection tools, analysis methods, and data credibility issues. The research design for this study was a case study that was analysed largely through qualitative methods mainly using thematic analysis. The chapter also briefly described several stages involved in the design and development processes of the research in this study.

The next chapter provides the research findings.

## **CHAPTER FIVE**

### **PRESENTATIONS OF FINDINGS**

#### **5.1 Introduction**

The aim of this chapter is to report on findings pertaining to environmental learning for drought coping among the small scale farmers of Luangwa District in Lusaka Province. The views from focus group discussion, interviewees and information obtained from the observations and other relevant documents form the focal point of this chapter. Qualitative data obtained from interviews, focus group discussion and observations were analysed thematically and that helped in bringing out emerging themes and subtitles accordingly. The results are presented and classified according to the framework of research objectives and questions posed for this study, as noted in sections 1.4 and 1.6, respectively.

#### **5.2 Drought Coping**

The first objective of the study was to establish drought coping strategies among the small scale farmers of Luangwa district. This objective was important as it served as an eye opener to the likely nature of environmental learning among the small scale farmers of Luangwa district. It is addressed in item 5.2.1 and 5.2.2, respectively.

##### **5.2.1 Drought Coping Strategies**

Documenting drought coping strategies in this study was paramount because it gave some insights into small scale farmers' competences thereby signalling the likely nature of environmental learning for drought coping. The overarching themes which emerged from drought coping strategies among small scale farmers of Luangwa District were; income generating activities, wild food harvesting, indigenous conservation farming and relief food.

###### **5.2.1.1 Income Generating Activities**

Under income generating activities the following activities were done;

1. engrossing their energies into beer brewing and later selling the beer so that some money is raised for other necessities.
2. harvesting fish for sell. Although, Luangwa District was drained by two major rivers (Luangwa and Zambezi), small scale farmers indicated that

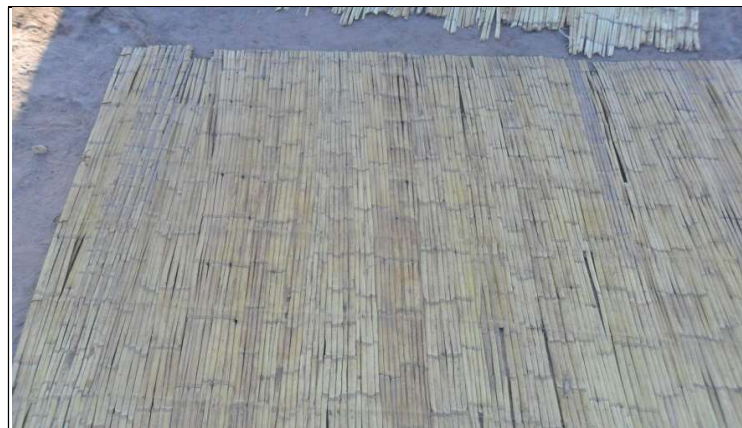
fishing was only restricted to Luangwa River to avoid confrontations with the Zimbabwean authorities as Zambezi River was shared between Zambia and Zimbabwe.

3. selling domestic animals like goats and chickens.
4. undertaking various craft work such as making baskets (*mfwanda*) and mats (*mpasa*). These items were sold and a bit of money were raised to cater for the small scale farmers' necessities. Craft work done to buffer drought impacts are shown in figures 5.1 and 5.2 respectively.

**Figure 5.1: A Couple in Luangwa District Making Threads for a Mat**



**Figure 5.2: Mat (*mpansa*)**



The following are participants' responses supporting these findings:

*benangu bama gulisa somba zamumana wa Luangwa.* (Participant 4, 31 st March, 2016, FGD) (Some sell fish harvested from Luangwa River).



*anthu ena amapanga mphasa ndi zipangizozina zonyamuliramo zinthu zimene*

*amagulisa kuti apezeko chakudya.*(Participant 4, 31<sup>st</sup> March, 2016, FGD). (Others make mats and baskets which they sell to raise money for food).

*lfe amene tili ndi mbuzi na nkuku, timagulisa zina mwaizi, kama ngati chilala chachilamo, timagulisa zonse pamodzi.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (For these of us who have goats and chickens, we sell some of them but when drought is severe, we sell all our domestic animals).

*anthu ena amaphika mowa wamene amagulisa kuti apezeko ndalama zogulira zakudya ndi zinthu zinazofunikira.* Participant 3, 31<sup>st</sup> March, 2016, FGD). (Some brew beer which is sold to raise an income for food and other necessities).

#### **5.2.1.2 Wild Food Harvesting.**

Some of the wild foods harvested during drought episodes included; wild okra (*punde*), wild yam (*busala*) baobab fruits (*mabuyu*) and *masau*. Pictures of harvested wild foods are shown in figures 5.3 and 5.4.

**Figure 5.3: Wild okra (Punde)**



*Figure 5.4: Wild yam (Busala)*



The following are verbatim quotations from the responses of the participants to support the findings above:

*ngati chilala chacilamo, timatenga delele ya musanga mpunde ndi busala yamene timadya kulibe nshima. Ndi chovuta kupeza unga.* (Participant 4, 31 st March, 2016. FGD). (When drought is severe we harvest wild okra (mpunde) and wild yam (busala) which we eat without nshima. It is so hard to find mealie).

*munthawi yachilala, timatenga masua na mabuyu.* (Participant 5, 31 st March, 2016, FGD) (During drought episodes, we gather masau fruits and mabuyu (baobab fruit).

### **5.2.1.3 Indigenous Conservation Farming**

Under indigenous conservation farming, small scale farmers of Luangwa District had an ecological understanding of Luangwa. They planted maize crops near the Luangwa River where soil moisture content was relatively high as compared to soils in their fields. However, not all small scale farmers had portions near the Luangwa river and so planting of maize crops near the river was only applicable to small scale farmers who had farming portions near the river. Further still, small scale farmers indicated that even small scale farmers who had portions near the Luangwa river did not produce the much needed cereal that could sustain them until the next farming season as the farming portions were relatively small. Verbatism response on indigenous conservation farming is shown below:

*anthu amene ali minda kufupi ndi msinje wa Luangwa, amayenda kuja nakukumba pansa; naku shangapo mbuto za milisi zokwanila 20 mokumbidwa mwamemo. Koma chaka chino, na milisi yamene yinashangidwa mokumbikamo yinaonongeka na zuwa.* (Participant 6, 31<sup>st</sup> March, 2016, FGD). (Those who have farming portions near Luangwa River, go to the banks of Luangwa River and dig up big holes and plant about 20 maize seeds in those holes. But this year, even the maize crops planted in those holes withered because of too much sunshine).

*tishanga milisi kuti tikatengemo unga. Ngati kuli chilala chikulu, milisi siyimakhalako chokonkhapo, kumakhala kulibe unga. Tinafuna kufa na njala chaka chino.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (We grow maize for mealie-meal. So when there is severe drought, maize doesn't survive hence no mealie meal. We almost died of hunger this year).

#### **5.2.1.4 Relief Food**

It was established that despite using the above coping strategies, the small scale farmers of Luangwa district continued to experience drought impacts such as food insecurity and therefore turned to the fourth coping strategy (relief food). This is also reflected in section 1.2 of this document. In connection with relief food as a drought coping strategy, small scale farmers;

1. participated in various labour-intensive works steered up by non-governmental organisations such as Child Fund. Instead of getting paid in monetary terms, the farmers were given food. The activity was called food for work.
2. entreated well wishes and perceived rich people to donate food stuffs.
3. requested the Government of the Republic of Zambia for food donations.

Some participants expressed these views:

*ngati cacilamo, tumapempa chakudwa.* (Participant 2, 31<sup>st</sup> March, 2016, FGD) (When severe, we beg for food).

*ngati chilala cacilamo, tumapempa chakudwa.* ( Participant 1, 31<sup>st</sup>

March, 2016, FGD).(when drought is severe, we beg for food).

All participants agreed that income generating activities, wild food harvesting, relief food and indigenous conservation farming were drought coping strategies among small scale farmers in Luangwa district. Having dealt with drought coping strategies among the small scale farmers of Luangwa district, the next point looked at vulnerability to drought.

### **5.2.2 Vulnerability to Drought**

The small scale farmers of Luangwa district were certain of their vulnerability to drought hazard. Most of them perceived their vulnerability from the social economic position only, while a segment perceived their vulnerability from both the socio-economic and biophysical angles (see 3.3.2). Vulnerability was important for this study because it highlighted the capacity of the affected community to cope with unpleasant situations.

#### **5.2.2.1 Socio – Economic**

Those who looked at drought vulnerability from a socio-economic angle indicated that they were vulnerable because they could not fend for themselves, ended up begging for and engaged in food for work activities during drought episodes. This is how one participant expressed his feeling:

*ndife anthu ofoka ku chilala chifukwa tivutika, tili na umphawi.*

(Participant 5, 31<sup>st</sup> March, 2016, FGD). (We are vulnerable to drought because we are poor people).

#### **5.2.2.2 Socio – Economic and Biophysical**

The segment that perceived their vulnerability from both socio-economic and biophysical angles mentioned that they were vulnerable because Luangwa was a valley and that they are poor people.

This was in line with some of the following views from participants in the study:

*sitingakwanise kukhala ndi zipangizo zothilira ndiponso tilibenso mosungila manzi chifuka tilibe ndalama zogulira zinthiizi.*

(Participant 2, 31<sup>st</sup> March, 2016, FGD). (We cannot afford to install

irrigation systems and we don't have water storage facilities because we don't have the money to buy those things).

*ndife anthu ofoka ku chilala chifukwa tivutika, tili na umphawi ndiposo kuno kwathu ku Luangwa ni ku vale.* (Participant 5, 31<sup>st</sup> March, 2016, FGD). (We are vulnerable to drought because we are poor people and that Luangwa district is a valley).

Other small scale farmers agreed to sentiments made by participant 5 and 2.

Having highlighted the coping strategies and vulnerability among small scale farmers of Luangwa district, the next section examines environmental learning for drought coping.

### **5.3 Environmental Learning for Drought Coping**

The second objective of the study was to examine environmental learning for drought coping. This objective was important as it was the backbone for the other two objectives. It is addressed in items 5.3.1 to 5.3.9.

#### **5.3.1 Drought Perception**

Getting small scale farmers' views on their perception of drought was imperative in this study. First, because 'perceptions' affect people's action and secondly, small scale farmers' perception of drought gave an insight into the nature of environmental learning for drought coping.

##### **5.3.1.1 Biophysical**

It was established that drought hazard was perceived from the biophysical angle. Small scale farmers perceived drought to be lack of rainfall during the rainy season coupled with high temperatures such that plants withered. They further indicated that drought meant change of time and contextually called it climate change. When they were probed to elaborate on climate change, they explained that climate change was changes in rainfall patterns, and therefore drought was climate change.

Verbatim responses on drought perception are indicated below:

*chilala ni kunsinta kyanyengo.* (Participant 5, 31<sup>st</sup> March, 2016, FGD) (Drought is change of time).

*kunsinta kyanyengo ndi climate change.* (Participant 1, 31<sup>st</sup> March, 2016, FGD) (Change in time is climate change).

*Chilala nikusoba kwa mvula koma kutentha kotelo kuti zomera zimafota.* (Participant 3, 31<sup>st</sup> March, 2016, FGD) (Drought is lack of rainfall with high temperatures such that plants wither).

Having dealt with drought perception, the next point looked at small scale farmers' views on the causes of drought.

### **5.3.2 Causes of drought**

Information on causes of drought was important for this study. It also shed more light on the nature of environmental learning for drought coping among the small scale farmers of Luangwa District.

#### **5.3.2.1 Biophysical**

It was ascertained that small scale farmers of Luangwa District perceived causes of drought from the biophysical angle.

Below are verbatim responses on causes of drought:

*mitengo zambili zitemewa kumusinje wa Luangwa. Icho cimallengesa kukhale chilala.* (Participant 4, 31<sup>st</sup> March, 2016, FGD). (Most trees have been cut along the Luangwa River and this causes drought).

*mwamene niganizila, chilala cimambwela na kusinta kwanyengo.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (My thinking is that drought is caused by climate change).

Other small scale farmers generally agreed to the idea that drought is caused by climate change and tree cutting

Having dealt with causes of drought, the next point looked at problems related to drought episodes.

### **5.3.3 Problems Associated with Drought Episodes**

In relation to problems that emanated from drought episodes, the following subthemes emerged:

### 5.3.3.1 Increase in morbidity

Increased morbidity was one of the major problems identified by the small scale farmers of Luangwa district. They argued for increased malnutrition cases among children, fatigue, epidemics and various ailments. They stated that lack of sufficient food during drought episodes, resulted in compromised immunity systems which capitulated into various ailments. Some participants lamented as follows:

*chilala chikapitilira chimalengesa matenda yakusowa kwa chakudwa kwa ana, kulema msanga ndi matenda ena.* (Participant 2, 31<sup>st</sup> March, 2016, FGD) (Drought causes an increase in malnutrition cases among children, fatigue, epidemics and various ailments).

*kuchepela kwa chakudya mu nthawi ya chilala kumalengesa kuchepela kwa mphamvu mu thupi zochingiliza kumatenda osiyana siyana.* (Participant 3, 31<sup>st</sup> March, 2016, FGD) (Insufficient food during drought episodes results in compromised immunity system which capitulated into various ailments).

### 5.3.3.2 Water scarcity

Water scarcity was another problem associated with drought. It was discovered that during and just after drought episodes, water became scarce so much that it impacted negatively on crops, domestic animals and ultimately, on small scale farmers. Small scale farmers claimed that the situation was exacerbated by the fact that most of them didn't own water storage facilities. As a result, fights over water points were common among small scale farmers. These findings are supported by the following verbatim quotations from the responses of the participants:

*chilala chimalengesa kuchepa kwa mauzi.* (Participant 5, 31<sup>st</sup> March, 2016, FGD). (Drought causes water scarcity).

*kulimbilana kwa mauzi kumayamba kwa alimi a minda zinong'ono.* (Participant 6, 31<sup>st</sup> March, 2015, FGD). (Fight over water source erupts among small scale farmers).

*ukhalilo umavuta chifukwa timakhala tilibe kosungula zinthu.* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (Situation is even worsened because we don't have storage facilities).

### 5.3.3.3 Insects infestation

According to the small scale farmers of Luangwa District, the on-set of drought was usually accompanied with aphid infestation. The following are participant responses supporting the findings above:

*zilombo monga tudoyo tumabwera munthawi ya chilala na kudya zolimidwa zimene zikali moyo.* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (A lot of insects called aphids come with onset of droughts and they eat all few surviving crops).

*tudoyo twamene utu tumavuta kutupisha na kutusiliza.* (Participant 4, 31<sup>st</sup> March, 2016, FGD). (These aphids are difficult to manage because a farmer cannot get rid off).

Other small scale farmers generally agreed to participant 1 and 4 assertions.

### 5.3.3.4 Hunger

Small scale farmers of Luangwa District pointed out that drought and inconsistent rainfall patterns were linked to hunger among people and domestic animals. They argued that crops and forage failed to survive due to lack of rainfall, consequently hunger set in. Some participants lamented as follows:

*kulibe chakudwa cha anthu ndi nyama.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (There is no food for both animals and food).

*chilala chimaleta anjala njala pakati pa nyama zosungidwa* (Participant 4, 31<sup>st</sup> March, 2016, FGD). (Drought causes starvation among our domestic animals).

*kuloka kwa mvula ku Luangwa kumabwela mvula iyenda mukusila. Mongo chino chaka inabwela mukusila kwa malichi.* (Participant 6, 31<sup>st</sup> March, 2016, FGD) (Sometimes rainfall in Luangwa comes towards the end of rain season. This year, it came towards end of March).

*rainfall for farming season 2015/2016 only came at the end of March, 2016. This delay, negatively affected farming activities among small*



*scale farmers of Luangwa District.* (Participant B, 31<sup>st</sup> March, 2016, Interview).

#### **5.3.3.5 An increase in poverty levels**

Small scale farmers argued that their farming fields were not dexterous in producing adequate crops for sale during drought episodes, hence making them financially handicapped. Lack of the financial muscle to buy farming inputs and other necessities made them poor. The following are participants' responses supporting these findings:

*chilala chimapangisa umphawi kupitilira chifukwa tilibe zolima zogulisa kuti tipezeko ndalama zogulira zinthu zina zofunikiramonga ndalama za sukulu fataleza, zolimila monga khasu ndi zina.* (Participant 3, 31<sup>st</sup> March, 2016, FGD). (Drought causes poverty levels to be high because we do not have excess crops to sell so that money is raised for other needed things like children's school fees, fertilizers and farming tools e.g. hoes).

Generally, other small scale farmers attested to the above argument.

#### **5.3.3.6 Increased crop failure**

It was discovered that most crops didn't flourish during drought incidents. Site observation by the researcher confirmed crop failure in all farming fields visited at the time of data collection. Information on problems associated with drought was helpful in identifying all drought related problems experienced in Luangwa District. The following are participants' responses supporting these findings;

*chilala chimaoninga mbeu zolimidwa.* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (Drought impact negatively on crops).

*mbeu zimene timalima zimaonongeka mu chilala.* (Participant 2, 31<sup>st</sup> March, 2016, FGD) (Most of the crops that we grow wither away during drought episode).

Other small scale farmers generally approved statements from participant 1 and 2. Withered maize crops in Luangwa District during 2015/2016 farming season are shown in figure 5.5.

*Figure 5.5: Withered maize crops in Luangwa district during the 2015/2016 farming season*



#### **5.3.3.7 Drunkenness**

A small segment of small scale farmers argued that drought caused drunkenness among them. As a temporal way of distracting them from the feeling of hunger, some drunk beer made out of masau fruit. They argued that masau brewed beer was easy to brew thus the drunk did not spend money on it. Verbatim responses are shown below:

*chilala chimalengesa anthu ena kukolewa ndi mowa.* (Participant 4, 31 st March, 2016, FGD) (Drought makes some to be drunk).

*mowa opandidwa ndi masau imalengesako anthu kuiwalako pa za njala nichifukwa chake anthu ambili amamwa mowa wa masau. Mowa wa masau niwapafupi kupanga ndiponso anthu samalipira ndalama kuti amwe.* (Participant 2, 31 st March, 2016, FGD) (Masau brewed beer offers a temporal distracting from the feeling of hunger hence a lot more people drink masau brewed beer during drought episodes. Masau brewed beer is easy to brew thus the drunk don't spend money on it).

Other small scale farmers did not contribute on this issue.

Upon presenting the problems associated with drought in Luangwa District, the next item looked at environmental learning among small scale farmers.

#### **5.3.4 Learning among Small Scale Farmers**

It was established that small scale farmers were exposed to some form of learning through an Agriculture Integrated Approach. The responses below support the finding:

*the Ministry of Agriculture has taken an Integrated Agricultural Approach to teach small scale farmers on different farming practices. However, Integrated Agriculture Approach is not about drought coping but general good farming practices* (Participant A, 30<sup>th</sup> March, 2016, Interview).

*We use an approach called Integrated Agricultural Approach to teach small scale farmers on issues that has to do with farming* (Participant C, 30<sup>th</sup> March, 2016, Interview).

*in partnership with Child Fund, educational activities are conducted to enhance small scale farmers' capabilities* (Participant D, 30<sup>th</sup> March, 2016, Interview).

Small scale farmers indicated that Extension Officers from the Ministry of Agriculture and Fisheries were the educators in integrated agriculture learning process. The aspect of Extension Officers being educators is also reflected in section 2.3.4.2 of this thesis. However, Participant A, B, C and D argued that educators for integrated agriculture were extension officers under the Ministry of Agriculture and Fisheries, and officers from Child Fund.

On topics covered under integrated agriculture approach, small scale farmers claimed that only moisture conservation was taught to them. However, educators indicated livestock farming, crop production, tree planting, conservation farming (minimum tillage) and fish farming as issues covered under the integrated agriculture. Below is the expression that confirmed the finding:

*small scale farmers learn crop production, tree planting, livestock farming and fish farming. Under crop production, small scale farmers learn on conservation farming (minimum tillage), planting of early maturing seeds, growing of drought resistant crops and intercropping. For intercropping, crops that we encouraged are cowpeas, pumpkins, maize, sorghum, sun hump and groundnuts. In Chitope and Katondwe areas of Luangwa District, small scale farmers are trained in good management of bananas. On tree planting, small scale learn on management of acacia tree. Learning on livestock includes knowledge on rearing of cattle, goats, guinea fowls and chickens. In addition, small scale farmers are trained in management of fish and fish ponds. Tilapia fish farming is generally encouraged among the small scale farmers. Training of the small scale farmers in various farming activities is at camp level and there are about nine camps in Luangwa district (Participant A, 30<sup>th</sup> March, 2016, Interview).*

Nevertheless, site visits to farmers' farm fields by the researcher did not indicate any signs of modern conservation farming, early maturing seeds or drought resistant crops. This information was vital in assessing the nature of environmental learning for drought coping. Presentations on environmental learning proceeded in environmental learning for drought coping.

### **5.3.5 Learning for Drought Coping**

The study revealed that small scale farmers learnt drought coping strategies from their parents. This is how one participant expressed his feelings:

*tiziwa mokhalira mu chilala chifukwa makolo athu anathunzisa kale mokhalila* (Participant 3, 31<sup>th</sup> March, 2016, FGD). (We learn drought coping strategies through information that was passed on from our parents).

Small scale farmers generally agreed on this issue. This information was vital in the design of an environmental learning programme for drought coping.

### **5.3.6 Sharing of Knowledge on Drought Coping among the Small Scale Farmers**

Small scale farmers of Luangwa District stated that sharing information on drought coping and good farming practices was unusual amongst them (see section 3.3.1.2). However, some form of irregular sharing took place between interested small scale farmers. This information was central to the process of assessing the nature of environmental learning among the small scale farmers of Luangwa District. One small scale farmer expressed her view in this manner:

*sikambili pomwe tima masulilana za nkhani* (Participant 5, 31<sup>th</sup> March, 2016, FGD). (We rarely share information amongst ourselves)

### **5.3.7 Mode of Teaching**

The researcher wanted to find out the methods used by extension officers, Non-Governmental Organisations (NGO) and parents cited in the educational activity. The study revealed that only workshops and demonstrations were used as methods of teaching by NGOs and extension officers, while learning from parents was through observations, guided and corrected approach. Such information on methods of teaching and learning helped this researcher in coming up with methods that would be effective in environmental learning programme for drought coping.

### **5.3.8 Assessments of Farmers' Learning Progress**

Both participant D and small scale farmers indicated that no assessments were done to evaluate the learning process. This information was helpful in coming up with viable assessment tools for environmental learning programme which is presented in item 6.5 of this document. Having looked at assessments on farmers' learning process, the next section addresses the background features of the proposed environmental learning programme for drought coping.

## **5.4 Dimensions of the Proposed Environmental Learning Programme for Drought Coping.**

This part of the thesis gives background features of the proposed environmental learning programme for drought coping that will address the identified inefficient drought coping in Luangwa district. Features of the proposed programme are addressed in items 5.4.1 to 5.4.6.

#### **5.4.1 Small Scale Farmers' Interest in Environmental Learning for Drought Coping**

All members of the focus group discussion agreed that they were interested in environmental learning for drought coping. This information was key in designing an environmental learning programme for drought coping appearing in item 6.5 of this document. Having dealt with small scale farmers' interest in environmental learning for drought coping, the next point looked at solutions to mitigate problems that emanated from drought.

#### **5.4.2 Solutions to Mitigate Problems Emanating from Drought**

Small scale farmers viewed mitigation for drought in Luangwa District from the points of infrastructure development, diversification and education. However, they indicated diversification and education to be of prime importance than infrastructure development. Information on mitigation was critical in deciding the relevant topics to be included in the design of an environmental learning programme for drought coping.

##### **5.4.2.1 Infrastructure development** (see section 3.3.2)

Small scale farmers of Luangwa District suggested dam construction and solar irrigation system installation as ways of addressing water scarcity. The following are participants' responses supporting these findings:

*tifuna solar irrigation.* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (We need solar irrigation).

*anatiuza kuti azapanga dam koma siyinachitike. Ni nkhani cabe yapa pepala.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (We were promised a dam but that has not materialised. It is just on paper)

*ndichofunikira kuti boma yipange dam kuti yitithandize kuthilira ndiponso kumbuyoku nili zokamba kuti apange dam koma siyinachitike.* (Participant 3, 31<sup>st</sup> March, 2016, FGD). (There is need for government to construct dams that could help with irrigation and that there been talks in the past about dam construction but that has not materialised).

Other participants did not contribute on this issue.

#### **5.4.2.2 Diversification**

The small scale farmers of Luangwa District felt that trainings on sewing and knitting, and bee keeping would help them to expand their income base than depending solely on agriculture. They looked at sewing and knitting, and bee keeping as income generating ventures. However, they argued that in order for them to engage in those income generating ventures, they needed soft loans from the government and other well-wishers. Below were expressions by some participants:

*boma ndi anthu ena angayambe kuphunzisa anthu pa za kusoka ndi kupanga kuti anthu apazeko zocita.* (Participant 4, 31<sup>st</sup> March, 2016). (The government and other well-wishers can introduce courses on sewing and knitting. Sewing and Knitting can be another income generating activity).

*tifunako na tumaloan kuti tizigula ma mashini yotungila ndi zinthu zina zofunikira pakutunga.* (Participant 6, 31<sup>st</sup> March, 2016, FGD) (But we need soft loan so that we could buy all sewing machines and other things needed in sewing and knitting).

*angatiphunzisenso mosungula nzimu kuti uchi tikagulisa uziti thandizako kuchila ku chetekela muzaulimi chabe.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (We could also be trained in bee keeping so that harvested honey can expand their income base than depending solely on agriculture).

The rest of small scale farmers generally agreed with participant 2, 4 and 6.

#### **5.4.2.2 Education**

Small scale farmers felt that education on drought coping was very important (see section 3.3.2). They contended that they were not getting enough education to help them cope with reoccurring droughts in Luangwa District. This was confirmed by the remark below:

*kufunika maphunzilo ambiri paza ukhaliro wamu chilala.* (There is need for more education on drought coping). (Participant 1, 31<sup>st</sup> March, 2016, FGD)

All the other small scale farmers unanimously stated in agreement for more education on drought coping.

Having dealt with solutions to mitigate drought, the next sub section looks at topics to be included in environmental learning programme for drought coping.

### **5.4.3 Suggested Topics to be covered in Environmental Learning for Drought Coping**

The researcher enquired from the small scale farmers the priority issues and topics that would be covered in environmental learning programme for drought coping. The emerging themes included: Crop Production, Livestock Farming, Bee Keeping and Fish Farming. The verbatim responses on topics to be included in environmental learning programme for drought coping are shown below:

#### **5.4.3.1 Crop Production**

*kuphunzidwa ndichabwino molimila mbeu zosiyanasiyana.*

(Participant 1, 31<sup>st</sup> March, 2016, FGD). (Learning would be beneficial if we are taught on good ways of growing different kind crops).

*na kuvuta kwa mvula, chingakhale chabwino kuphunzidwe pa mbeu*

*zolima mu chilala.* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (With irregular rains, it would be good to know types of crops that would grow and survive drought episodes).

Other small scale farmers generally agreed to the issue of crop production.

#### **5.4.3.2 Livestock Farming**

*nyama zathu sizichita bwino. Kuphunzidwa mosungila nyama monga*

*mbuzi na ng'ombe kungathandize kwambili.* (Participants 3, 31<sup>st</sup> March, 2016, FGD). (Our animals have not been doing well. Education on how to do rear animals like goats and cows would help a lot).

*kuphunzidwa mosungila nkuku nako kungathandize kupeza ndalama*

*za sukulu ndi zinthu zina.* (Participant 4, 31<sup>st</sup> March, 2016). (Learning on how to take care of chickens would help us have another business that may help raise money for school going children and other things).

All other small scale farmers unanimously stated in agreement with participants 3 and 4.



#### 5.4.3.3 Bee Keeping

*kusunga nzimu ndi chigawo chimozi mwamene tingaphunzidwa.* (Participant 6, 31<sup>st</sup> March, 2016, FDG). (Bee keeping is another area we need to be educated in).

*kusunga nzimu kungathandize kuleka kuchetekela mu ulimi.* (Participant 1, 2016, FDG). (Bee keeping would help reduce reliance on farming).

#### 5.4.3.4 Fish Farming

*kuphunzidwa pa zakasungidwe ka nsomba nako kungathandize.* (Participant 2, 31<sup>st</sup> March, 2016, FDG). (Fish farming could be an income generating activity and source of food).

*tifina kuphunzidwa pa mosungila nsomba.* (Participant 3, 31<sup>st</sup> March, 2016, FDG). (We wanted education on how to conduct fish farming).

Almost all other small scale farmers unanimously stated in agreement except for two who didn't say anything on fish farming.

#### 5.4.4 Mode of Teaching

Small scale farmers of Luangwa District identified radio programmes, exchange visits, field days and trainings as effective modes of environmental learning for drought coping. The following are verbatim quotations from the responses of the small scale farmers to support the findings above:

*tifuna ma radio programme chifukwa ngakhale kuti ophunzisa adwala tingamvelere ku radio na kuphuuzira pa zochita* (Participant 1, 31<sup>st</sup> March, 2016, FDG). (We want radio programmes because even if an extension is sick and he is not able to attend to us, we could still listen to the radio and be able to learn).

*tifuna zotandalirana ziyambiko* (Participant 4, 31<sup>st</sup> March, 2016, FDG). (We want exchange visits to be introduced). *Kulibe nkhani zotandalirana kuno ku Luangwa. Ophunzisa za ulimi atiuza kuti kulibe ndala pa za kutandalirana. Kutangalirana ndikwabwino pa kuphunzila kwa wina ndi muzache* (Participant 6, 31<sup>st</sup> March, 2016).

(There are no exchange visits here in Luangwa district. Extension officers tell us that no money for exchange visits. Exchange visit are important ways of learning from others).

*kuphuzisidwa ndi kutandilira minda ndi kwabwino ndiponso tivifuna na ife* (Participant 2, 31<sup>st</sup> March, 2016, FGD). (Field days and any form of training are also important and thus we want them also).

All the other participants unanimously agreed with the suggested topics. The information was important in designing an environmental learning programme for drought coping. After suggested mode of teaching, the next item looked at assessment strategies.

#### **5.4.5 Assessment Strategies**

On assessments, emerging themes included:

- group discussion
- field days

This information was helpful in coming up with appropriate methods of assessing the learning process. Verbatim responses on assessment strategies are indicated below:

##### **5.4.5.1 Group Discussion**

*chingakhale bwino kuti ophunzisa zaulimi atibwelese pamozi ndiponso mulimi aliyense akambepo mwamene alimila kuti tiphunzisane patekha ndiponso ophunzisa angayesa alimi onse amene alipo.* (Participant 5, 31<sup>st</sup> March, 2016, FGD). (It would be good for educators to bring us together and each farmer to give their experiences on farming so we could learn from each other and later educators assess the progress of all farmers present). All small scale farmers agreed to that issue.

##### **5.4.5.2 Field Days**

*Ophunzisa aziona mwamene tilimila na kutiyesa pa zinthu zimene timachita mu minda yathu.* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (Educators should be checking on our progress and be able to assess us from the progress we have made in our farming fields).

All small scale farmers attested to that issue

Having established suggested assessment strategies, the next sub section deals with suggested language of communication.

#### **5.4.6 Language to be used in Educating Small Scale Farmers**

The small scale farmers of Luangwa District stated that Nyanja language could be used as the medium of communication in their educational activities. This was in line with the following view in the present study:

*tifuna kuphunzidwa mu chinyanja kuti timvese mokwanila zimene tizaphunzidwa. Tisewensela chinyanja pa kukambisana kuno, so ndiye chilankhulidwe chimene timvela bwino* (Participant 1, 31<sup>st</sup> March, 2016, FGD). (We want to be taught in Nyanja Language so that we understand clearly what we will be taught. We use Nyanja for communication so it is the most ideal language for us).

Other participants generally agreed to this point. This finding was important in designing a localised environmental learning programme that would be effective and responsible to the needs of the small scale farmers.

#### **5.5 Summary**

The chapter outlined drought coping strategies used by the small scale farmers of Luangwa District and demonstrated that those drought coping strategies were inept for reoccurring drought episodes experienced in Luangwa District. Detailed interpretations of these findings were given in the discussion chapter. Further, the findings showed that extension officers and NGOs conducted some form of education on good farming practices. Even though extension officers and NGOs were involved in educating small scale farmers on farming, the study revealed that small scale farmers learnt drought coping strategies from their parents and that traditional coping strategies formed the basis for drought coping. Detailed interpretations of these findings were also provided in the discussion chapter. The study demonstrated that new knowledge or insight emerged from the present study regarding drought coping strategies and environmental learning for drought coping in Luangwa District. In order to address challenges of drought coping among small scale farmers, recommendations are presented in chapter six (6) arising from the presented findings.

In the next chapter, the findings will be discussed in relation to the objectives of the study.

## CHAPTER SIX

### DISCUSSION OF FINDINGS

#### 6.1 Introduction

This chapter presents discussions of the findings. The chapter follows the same framework formed by research objectives and questions as noted in chapter 5. As a reminder, specific objectives of this study were:

- a) to establish drought coping strategies among small scale farmers of Zambia's Luangwa district
- b) to examine environmental learning related to such drought coping strategies so to determine its appropriateness to drought coping
- c) to propose how additional forms of Environmental learning may empower small scale farmers in addressing drought for the future

The primary purpose was to examine environmental learning for drought coping among the small scale farmers of Luangwa district. The discussion involved the interpretation of the research findings from each theme in line with the research objectives. This meant that after presenting data, the interpretation of the findings ensued. The discussion also established commonalities between views of different informant groups which in turn served as a means of validating the findings of the study. Ultimately, the discussion culminated into a proposed environmental learning programme for drought coping. Symbols have been used to maintain anonymity of the participants. Refer to section 5.1 of this document.

#### 6.2 Drought Coping Strategies

The first objective was to establish drought coping strategies employed by the study community. This is addressed in items 6.2.1 and 6.2.2.

##### 6.2.1 Coping Strategies

To augment the compromised agriculture sector in Luangwa district, small scale farmers engaged in drought coping strategies such as wild food harvesting, indigenous conservation farming, relief food and income generating activities. All views expressed on coping strategies resonated well with reviewed literature. For example, Chabatama (1999) stated that during drought episodes, the Zambian people of North Western Province survived on hunting and gathering wild products in pre-

colonial time. Others sold animals and used that money to buy other food stuffs (Kalinda, 2014). Liquidation of productive assets such as livestock, land, trees and other assets was another coping strategy used by small scale farmers (Shiferaw *et al*, 2014). Zambian communities also coped with drought, by gathering wild products such as fruits, flowers and tubers for food (Doke, 1931; Siamwiza, 1998). Chikuni missionaries employed women, girls, boys and young men in return for food (Siamwiza, 1998). The strategy of engaging in income-generating activities was well documented also (Chifuwe, 2006).

### **6.2.2 Vulnerability to Drought**

The study established that small scale farmers were vulnerable to drought hazard as demonstrated by their inability to fend for themselves and their families during drought episodes. This finding corresponds to Watts and Bohle (1993) assertion that vulnerability has to do with exposure to disaster and the inability to positively respond to that disaster. Most of the small scale farmers perceived their vulnerability from the socio-economic viewpoint while a segment saw their vulnerability from both the socio-economic angle and the biophysical point of view. Those who perceived vulnerability from the socio-economic sphere pointed out poverty as a key ingredient to their vulnerability. In the same line of thinking, Anderson and Woodrow (1993) argued that poverty is the most obvious physical vulnerability. Like Anderson and Woodrow, Ribot (2009) contended that the poor are unlikely to buffer themselves against and recover from stress. Because the underprivileged lack the ability to cope with stress and are affected more than the well-off, there is a strong link between poverty and vulnerability (CEDRISA, 2009; Eriksen., O'Brien and Rosentrater, 2008; and von Braun., Teklu and Webb, 1998). It can thus be construed that poverty made the small scale farmers of Luangwa District to be financially incapable of purchasing grain and other agricultural inputs needed to facilitate smooth cropping. This became a vicious cycle whereby exposing them to future drought exigencies.

On the other hand, those who viewed vulnerability from both the socio-economic and biophysical spheres pointed out poverty and the topography of Luangwa District. This suggests that the people perceived their vulnerability from different angles and that factors that influence societies' vulnerability were many and complex.

Vulnerability is thus multifaceted and cannot be based on a single variable (Adger, *et al.*, 2003). As correctly observed by Wisner *et al.* (2004), structural functional theory demonstrated that small scale farmers' vulnerability was as a result of interactive effects of the social and physical aspects of a system. The findings were in agreement with the advocates of structural functional theory whose stance is that, people's vulnerability to hazards is generated by root causes such as poverty and limited access to power and resources, and is further increased by dynamic pressures *e.g.* urbanization, unemployment, lack of education, and unsafe conditions such as old houses and lack of preparedness (Wisner *et al.*, 2004) (see section 3.3.2).

### **6.3 Environmental Learning for Drought Coping**

The second objective in this study was to examine environmental learning for drought coping. This objective is addressed in items 6.3.1, 6.3.2, 6.3.3, 6.3.4 and 6.3.5.

#### **6.3.1 Drought Perception**

The type of perception in this study is exteroception (external perception that enlightens us about the world outside our bodies). Exteroception focuses on investigating how people make sense out of their physical environment under the influence of their socio-ecological and mental backgrounds (Muchanga, 2013).

All the small scale farmers involved in this study, perceived drought from the biophysical viewpoint. Although all viewed drought from a biophysical dimension, there were some variations in the small scale farmers' belvedere. A small fragment perceived drought to be lack of rainfall during rainy season coupled with high temperature such that plants withered away. This finding was congruent with Michelo (2000), argument that drought perception in Africa brings to mind withering of crops and excessive high temperatures among the affected people. The finding was also in line with Iglesias *et al.*, (2009) argument that drought is an insidious natural hazard that results from a deficiency of precipitation from expected or "normal" such that when it is extended over a season or longer period of time, the amount of precipitation is insufficient to meet the demands of human activities and the environment. Small scale farmers' perception in this context was generally satisfactory.

In addition, most of the small scale farmers indicated that drought was climate change. The above responses indicated that people have different ways of conceptualising ideas. As noted by Puck and Stibbards (2012), the critical realists' perspective demonstrated that understanding what someone means when they use specific concepts is important and it presents a view of what is found in their thoughts. This then calls for researchers to use 'alternative conceptions' models that allow the flow of experience based explanations through which learners (small scale farmers in this context) make a arrange of abstractions from natural phenomena as a path that leads to understanding and knowledge (Puck and Stibbards, 2012). It follows that how we make sense of one concept or subjects is dependent on the concepts used to construe it (Sayer, 2000). Abstraction in this context is a process that helps people to delineate boundaries within their perceptions by distinguishing what they see, hear, feel, experience, touch, and envision in different perspectives, and separating what is relevant from what is not (Ollman, 2003)(see section 3.2.5). Nevertheless, the above responses indicated a fragmented perception of both drought and climate change. The following was the reason that supported the assertion that small scale farmer's perception of drought and climate change was fragmented: for small scale farmers of Luangwa District, climate change was drought, yet drought is one of the negative effects of climate change. Climate change entails a major climatic change for a longer period of time in all constitutes of climate such as humidity, sunshine, air pressure, precipitation, wind and temperature. Although there could be other explanations, this fragmented understanding of drought and climate change could be attributed to the superficial nature of an integrated agriculture approach used in the learning activity. Accordingly, it can be construed that understanding small scale farmers' perception of drought in this study has helped to identify areas of weakness in small scale farmers' drought perception. This opens up an opportunity for a different educational approach so as to fill those areas of weakness. This can be achieved through environmental learning of drought coping. This may help unlearn misconceptions on drought and climate change and augment new knowledge and knowledge structures. Ultimately, it may enhance the possibility of achieving the most desirable behavior towards drought coping.



### 6.3.2 Causes of Drought

It was established that causes of drought were perceived from a biophysical angle. Small scale farmers unanimously stated in agreement that drought was caused by climate change and cutting down of trees for charcoal processing. Like Njovu (1993) who erroneously perceived drought as an act of God, small scale farmers' responses showed specious perceptions or misperceptions as they seemed to address factors that aggravate drought occurrence than the causes. Establishing misconceptions on the causes of drought was congruent with the philosophy that informed this study (see section 3.2.5). An understanding that reality exists in spite of our perception of it opens up prospects of establishing misconceptions and the need for a different educational approach to help small scale farmers unlearn misconceptions on causes of drought. This researcher also contends that although there may be other scientifically proven causes of drought, Chenje and Johnson (1994) and SADC, (2008) offered a contextual and satisfactory cause of drought. Chenje and Johnson (1994) and SADC, (2008) argued that El Niño phenomena is associated with the reduction of southern Africa's rainfall, an impact that has led to the region experiencing frequent drought conditions. In addition, Wisner, *et al.*, (2004) indicated that El Niño phenomena causes drought in different parts of the world. Wisner and others argued that devastating droughts of 1875-1876 (northern China), 1877-1878 (Brazil, India and Morocco) and 1888-1889 (Russia, Korea and Ethiopia), were caused by El Niño effects. In view of the above, Anderson and Woodrow (1993) and Unganai (1994) gave advice that droughts are actually inexorable and that effective management of their impacts could prevent catastrophic outcomes.

Moreover, apart from establishing misconceptions from the intransitive aspect of reality, this researcher argues that the transitive (motivations for cutting trees) could be helpful in understanding and improving small scale farmers' relationship with nature (see section 3.2.5). It was therefore established that charcoal burners cut trees for charcoal processing and later charcoal was sold to earn an income. In this case, reality can also be seen to be socially constructed whilst underlying structures and mechanisms of the physical world determine social arrangements and understandings (Hughes and Sharrock 1997). This then calls for researchers to build on models of understanding the transitive dimension that would account for the natural phenomena under scrutiny (Blaikie, 1993). Thus, this researcher argues that establishing

misconceptions on causes of natural hazards from intransitive nature of reality and understanding the transitive nature of reality (social processes) may foster formulation of good educational programmes and policies towards environmental management. The aspects of intransitive and transitive are exemplified in section 3.2.5 of this thesis.

### **6.3.3 Problems Associated with Drought Episode**

The next important question asked was on problems associated with drought. The major emerging themes were hunger, increase in morbidity, water scarcity and aphid infestation. The least response that didn't get support from all small scale farmers of Luangwa District was drunkenness.

Even though it cannot be disputed that drought has a definitive oddity to foster hunger among the affected individuals, this study established that both drought and inconsistent rainfall patterns were linked to hunger. Small scale farmers of Luangwa district reported that in years when there wasn't drought, rainfall came in late whereby affecting crop yields. Both drought and inconsistent rainfall patterns put small scale farmers in a situation of uncertainty thereby disrupting farming activities. Disruption in farming activities resulted in poor yields and subsequent hunger for small scale farmers.

Another problem associated with drought and inconsistent rainfall patterns was inadequate fodder for domestic animals. In times when there was inconsistent rainfall, pasture was not enough for domestic animals to survive on. Hunger was even worse during drought events as there was almost no fodder for domestic animals. Lack of rainfall resulted in poor pasture growth and ultimately led to a decline in fodder supplies. This finding was in accordance with Huho (2012), revelations that during drought events, insufficient levels of fodder around West Pokot villages actually led to hunger and increased deaths among stock.

Furthermore, it was also established that drought events in Luangwa District adversely affected water supply among the small scale farmers. The situation was more precarious since small scale farmers didn't have water storage facilities.

In addition, this study ascertained that demand for water often climaxed in fights among small scale farmers. The finding was congruent with Huho (2012), who asserted that during the 2007 drought, the search for water and pasture made the

Pokot pastoralists to migrate to Mt. Kadama in the Kenya-Uganda border causing conflicts with the Karamajong. He further affirmed that other water and pasture-related conflicts in Kenya occurred in 2009, 2011 and in early 2012. Like in West Pokot, Pleijel *et al.*, (2005) suggested that in Darfur region of Sudan, the main cause of conflicts between tribes was water, pasture and other natural resources. Although peace building initiatives are helpful in conflict resolution, studies have shown that conflict over access to water and other natural resources are difficult to resolve especially if connected to extreme weather conditions (Huho, 2012; Juma, 2000). The reason for such a scenario is that most peace building interventions focus on the context of the conflict rather than the root causes of the conflict (Juma, 2000). Lasting peace among the warring communities can only be achieved by addressing the root cause of the conflict (Juma, 2000). In view of the above, sustainable use of water could avail much. This entails changes in the way small scale farmers use water, quantities used and water storage. Since Luangwa District experiences floods now and then, small scale farmers could be helped with water storage facilities and be taught on water harvesting techniques. Further, small scale farmers could also be educated on sustainable water usage. This is likely to enhance availability of water which may minimize fights over water sources, increase food security and enhance livelihood sources with an overall reduction in poverty levels.

Morbidity issues such as fatigue, malnutrition, various ailments and epidemics, were also mentioned as major problems associated with drought. The finding supports Stanke *et al.*, (2013) assertions that there is a linkage between morbidity and drought. Stanke *et al.*, (2013) however avowed that the linkage is a complex and an indirect one. In line with Stanke *et al* (2013) thinking, UNISDR (2011) contend that health related problems profoundly depend on the socio-economic environment that dictates the affected community's ability to cope or manage drought. UNISDR (2011) posited that poverty, existing health and sanitation infrastructure, conflict and available resources with which to mitigate impacts as they occur, determines drought/ health relationships. What comes out clearly in the health- drought relationship is that, humans and animals depend on food and water in order to be healthy. Among the rain fed agriculturalists, lack of rainfall entails crop failure and limited water supply which usually culminate in numerous illnesses. Thus drought and health are inextricably intertwined.

Another major problem highlighted by the small scale farmers of Luangwa District was infestation from insects. This finding concurred with the Assessment Report of 2003. According to the Report, severe weather (e.g. drought) conditions are usually followed by infestations from insects. Like Assessment Report (2003), (California Forest Pest Council, 2002) noted that in California, drought conditions returned in 2000 and 2001, marking an increase in insect infestation.

Another least supported problem associated with drought was drunkenness. A small segment of small scale farmers argued that drought caused drunkenness among them. Beer-drinking as a response in these circumstances seems to be too trivial from face value. However, this study demonstrates that it is important to understand people's experiences and follow the logic behind that response and this stance resonates well with this researcher's philosophical lenses (see section 3.2.5). Thus researchers must be concerned themselves with probing responses with the view of producing detailed explanations regarding how, and in what circumstances the biophysical world impacts on the social world and vice versa (Bergin *et al.*, 2008; Bhaskar, 2009). Before dismissing responses as erroneous, investigators should prudently probe participants in order to reconnoitre their meaning and logic and establish the validity of the responses in relation to wider knowledge (Muchanga, 2013). Nevertheless, it does not mean that all responses should be assented to as 'correct' (e.g. drought caused by climate change). Thus the preceding understanding also correlates well with critical realism understanding that reality exists despite our fallacy understanding of it (refer to section 3.2.5).

This section has demonstrated that problems associated with drought were closely intertwined with the social economic status of the small scale farmers of Luangwa District. Small scale farmers sold their produce to supplement their income. With reoccurring droughts, they did not have enough food and water; they failed to raise funds for farming implements, send children to school or for constructing water storage facilities. It is well known that farmers with financial capacity could easily construct water storage facilities and manage their crops and livestock and buy needed insecticides to deal with infestations. But this was almost completely out of reach of the small scale farmers of Luangwa District. This resulted in a vicious cycle of poverty, as noted by Chaudhury (2011) that farmers in developing countries depend on rain-fed agriculture and natural resources for food production and income

generation and may particularly experience greater levels of poverty and hunger as their sources of livelihood become increasingly exposed to climate-related risks. The argument on drought being pegged to the social economic status of small scale farmers of Luangwa District was congruent with the advocates of structural functional theory who believe that individuals are susceptible to climatic shocks such as drought because of being poor and occupying unsafe settlements (refer to section 3.3.2).

#### **6.3.4 Learning among the Small Scale Farmers**

At the time of data collection, small scale farmers indicated that only Extension Officers from the Ministry of Agriculture were involved in educating them on good farming practices. Significantly, there were many other studies that supported this finding including the following; (Makasa 2002; Mbashili 2007; Mbozi, 2000; Suzuku 2002). However, this finding was inconsistent with participants' A, B and C assertions. They asserted that extension officers and an NGO (Child Fund) were involved in educating small scale farmers of Luangwa District. This discrepancy could be attributed to lack of much interaction between the small scale farmers and the educationists. Whatever the case, educationists and the small scale farmers of Luangwa District should be able to interact and work together towards effective drought coping. This aspect of teacher/ learner interaction is palpable in sections 3.3.1.2 and 3.4.1 of this document.

It was also discovered that an Integrated Agriculture Approach was used in educating small scale farmers of Luangwa District. Under the Integrated Agriculture Approach, participants A and D avowed that small scale farmers learnt crop production, tree planting, livestock farming and fish farming. However, small scale farmers indicated that only moisture conservation was covered by both extension officers. This disparity on topics covered under integrated approach could be due to the fact that all indicated topics by the educators were not yet implemented according to plan. The situation was even more complex as there was no evidence of learning/teaching materials to support the educators' assertions. This finding also cast a dark shadow on the nature of environmental learning for drought coping as learning and teaching materials are an integral part of effective learning.

It was also established that an Integrated Agricultural Approach focused on good farming practices in general and not specifically on drought coping. Although a claim was made that a small component on drought was covered in this Integrated Agriculture Approach, the study established that learning for drought coping had been superficial in nature (see section 3.3.1.4). Without doubt, learning about general farming practices was good. However, environmental learning among the small scale farmers of Luangwa District would be more viable if learning was specific to drought since Luangwa District was a drought prone area and drought was the greatest threat to the wellbeing of the small scale farmers of Luangwa District. Thus, effective environmental learning for drought coping must embrace learning activities that are responsive to local environmental context and issues. Furthermore, the use of an Agriculture Integrated Approach to drought coping was inconsistent with Lave and Wengers' (1991) model of learning presented in situated learning theory. This is evidenced in section 3.3.1.3, 3.3.1.4 and 3.4.1 of this thesis. Lave and Wenger (1991) argued that effective learning involves knowledge situated in a relevant or authentic manner. Learning must be problem driven, concrete and contextual within the prevailing situation. Knowledge needs to be presented in an authentic context, i.e., locales and applications that would normally involve that knowledge (McLellan, 1995). Thus, in the context of the small scale farmers of Luangwa District, learning has to be about, in and for drought coping. Learning about, in and for is shown in section 2.2.6 of this document.

### **6.3.5 Mode of Teaching**

Participants A, B, C, D, and the small scale farmers of Luangwa District agreed that workshops and demonstrations were used as teaching methods in the small scale farmers' learning process. Similarly, the findings of this study confirmed the earlier findings by Makasa (2002), who stated that workshops and demonstration were used as teaching methods among small scale farmers of Mambwa District of Central Province of Zambia.

Moreover, small scale farmers of Luangwa District also indicated that Agriculture Extension Officers gave them (small scale farmers) an opportunity to air out their views during workshops and demonstrations. This discovery was inconsistency with Mbozi's (2000) and Worth's (2006) findings. Mbozi, (2000) and Worth (2006)

postulated that the agricultural extension in Zambia, operated through a linear mode of technology transfer, conveying to farmers the latest technologies to improve production, with success measured by the rate of adoption without giving farmers a voice in the whole process. The key assumption in the above linear mode of agriculture extension services delivery was that scientists did the research and design, extension workers disseminated and farmers consumed (Leeuwis, 2004). Some of the limitations of the linear mode of agriculture extension services comprises supply-driven by scientists; a lack of consideration of local knowledge, diversity, sustainability and farmer needs; and farmer inability to afford the kind of technologies being promoted (Mutuke, 2010). However, findings on giving small scale farmers a voice showed some form of change in the linear mode of extension services as used in Luangwa District. In another study, Mutuke, (2010) also noted these changes when he stated that some changes had occurred in the way extension services were carried out over the past decades.

Whatever the case, it remains a well-known fact that learners have different learning styles, preferences and ways of expressing knowledge and skills (Thompson-Schill, Kraemer, Rosenberg, 2009). Thus the use of varied strategies, techniques and teaching methods would be more beneficial than engaging small scale farmers in only workshops and demonstrations. By being knowledgeable that small scale farmers have different learning preferences, educators can learn to efficiently communicate in ways that small scale farmers can understand. Thus diverse strategies, techniques and teaching methods may ensure that small scale farmers have an equal opportunity to learn, share and take responsible action based on new information learnt. Educators should therefore consider diversity among learners if they are to help them retain information and strengthen understanding (Baptista, 2011).

### **6.3.6 Assessment of Teaching and Learning Activities**

The study also revealed that there were no assessments done to weigh the teaching-learning process. This was at variance with Mbozi (2000), finding who articulated that farmers' learning process was measured by the rate of technology adoption. Even though assessments for teaching and learning were not conducted, assessment serves important purposes that must never be over looked. Assessment determines if

objectives have been achieved and resources used appropriately. It is also conducted to improve on-going and further capacity development efforts. Thus for a learning programme to be effective, assessment mechanisms must be put in place.

### **6.3.7 Learning for Drought Coping**

The study revealed that small scale farmers learnt drought coping strategies from their parents. All the other participants unanimously stated in agreement that they learnt drought coping strategies from their parents. Teaching/learning methods used for drought coping here included observations, guided and correction. This correlated well with Mbozi (2000) who showed that among the small scale farmers of Southern Province of Zambia, observation, guided and correction approach comprised the teaching methods. The study also showed that traditional drought responses were the main coping strategies utilised by the small scale farmers of Luangwa district. This could be that the content covered under integrated agriculture was not situated to drought coping. This situation had a potential of making learning to be a disjointed process whereby, making it impossible for small scale farmers to isolate components which could be helpful for drought coping. Further, there was a possibility that the educators did not link traditional ways of drought coping to modern knowledge as covered in the integrated approach. Ultimately, this made it hard for the small scale farmers of Luangwa district to negotiate and integrate traditional knowledge with new knowledge hence holding on to traditional coping strategies.

Such a scenario calls for an introduction of environmental learning for drought coping rather than an integrated agriculture approach that merely covers good farming practices. Environmental learning approach for drought coping would require educators to foster acquisition of new knowledge and practices from other knowledge systems (modern scientific knowledge) while enhancing traditional knowledge and skills for drought coping. Traditional knowledge cannot be abandoned completely because it is situated within an ever changing local environment (Sikana, 1994) and still has the propensity of enhancing agricultural development among the small scale farmers (Chambers, 1997). Therefore, a combination of other knowledge systems (modern scientific knowledge) and traditional scientific knowledge may make learning relevant, at the same time, help small scale farmers of Luangwa District develop and apply innovative approaches to



drought coping. Tackling environmental issues such as drought through environmental learning demand for much learning from experiences that may be different from already existing ones, that is, there is an element of social innovation (Co-operation America Relief Everywhere (CARE), 2010), but at the same time embracing traditional knowledge that provides ways of teaching and learning locally relevant knowledge and skills. Analogously, modern science should exist side by side with alternative sciences (traditional science) (Visvanathan, 2006).

Environmental learning for drought coping among small scale farmers of Luangwa District could be helpful if learning stages as articulated by Mukute (2010) are implemented. The stages include:

1. Scaffolding; using traditional ways of knowing (knowledge and skills) as a spring board, small scale farmers would move to the next level of understanding drought through other knowledge systems (modern scientific knowledge) with the assistance of an educator who leads the small scale farmers to mastery.
2. Cultural interpretation of learning; where an educator would exchange ideas with the small scale farmers to help them make connections between traditional knowledge and other knowledge systems (modern scientific knowledge). Educators must be in a position to assist learners move from situated everyday understandings to scientific concepts (Edwards, 2005)
3. Collectivist interpretation of learning; where small scale farmers with different experiences and perspectives work together on drought coping and strive together to develop new knowledge or tools for effective drought coping.

This researcher thus argues that since our knowledge of reality may be inadequate (refer to section 3.2.5), educators should ensure that modern scientific knowledge dialogues and negotiates with traditional knowledge on drought coping to create possibilities for efficient drought coping among the small scale farmers of Luangwa District.

### **6.3.8 Sharing of Knowledge among the Small Scale Farmers**

The study also revealed that knowledge sharing on drought coping was atypical among members study community. The finding demonstrated little social interaction

and engagement in the community of practice and this was at variance with Situated Learning Theory (see section 3.4.1). The advocates of situated learning theory argues for social interaction, sharing of information and collaboration within a community of practice (among the small scale farmers) rather than individual action from a decontextualized body of knowledge (Kirshner and Whitson 1997; Lave and Wenger 1991). In situated learning, small scale farmers are expected to engage in a ‘community of practice’ share a concern for drought and learn how to cope with drought as they interact regularly. They also need to network among themselves in ways which mobilise a diversity of values and viewpoints, identify conflicts and differences, and expedite a process of learning towards a new, shared perspective and way forward (Rosenberg, O’Donoghue and Olvitt 2008). Furthermore, lack of proper interaction among the study community showed a discrepancy with this study’s philosophical lenses.

#### **6.4 Dimensions of the Proposed Environmental Learning Programme**

The third objective was to propose an environmental learning programme for drought coping. The programme focuses on drought and drought coping in Luangwa District. Designing environmental learning programme for small scale farmers of Luangwa District was based on suggestions from the small scale farmers and the researcher’s analysis. The dimensions are addressed in items 6.4.1 to 6.4.5.

##### **6.4.1 Solutions to Mitigate Problems Associated with Drought**

In this section, the researcher wanted to isolate issues that could be included as topics in the proposed environmental programme for drought coping. It was established that small scale farmers of Luangwa District indicated infrastructure development, diversification and education as mitigation responses to drought. The responses signified that apart from infrastructure development and education, diversification would help farmers to venture into other income activities. This may have positive effects on small scale farmers’ livelihood and on the implementation of environmental learning programme. This is because environmental education has little impacts on the livelihood of the poor and the disadvantaged (Aongola Bass, Chileshe, Dalal- Clayton and Liayo, 2009) if their economic challenges are not addressed. With social nets and good policies in place, environmental learning would be a success story.

#### **6.4.2 Topics to Include In the Environmental Learning Programme**

Like item 6.4.1, the researcher wanted to find out from the small scale farmers more issues that could be included in environmental learning programme. The small scale farmers of Luangwa District said that learning would be beneficial if they were taught on crop production. According to them, this would make the activity of farming viable in the face of drought episodes. On livestock farming, they stated that most of their animals had not been doing well because of drought. They indicated that education on how to rear animals like goats and cows would help them a lot. They also said that learning on how to take care of chickens would help them have another business that may help raise money for farming implements and money to support their school going children. Furthermore, the small scale farmers said that bee keeping was another area they needed to be educated in. They hinted that bee keeping would help them reduce reliance on farming. On fish farming, small scale farmers noted that fish farming could be an income generating activity. They said they wanted education on how to conduct fish farming. From the findings, it can be deduced that the proposed educational topics were influenced by the perceived effects of drought on farmers' livelihood. The diversity of topics suggested by the small scale farmers of Luangwa District generally showed that diversification was an important aspect to consider in environmental learning for drought coping. Agriculture and natural resource management, with emphasis on crop production, bee keeping, fish farming, and livestock farming, were for sure relevant to drought coping. As noted by Kronlid, (2009) learning conditions are likely to get better if learners' spaces of capabilities are expanded and enriched. Thus the medley of topics on agriculture and natural resource as suggested by small scale farmers have the potential to expand small scale farmers' capabilities and competences for coping with drought.

#### **6.4.3 Mode of Teaching to be Used**

The small scale farmers identified radio programmes, trainings, exchange visits, field days and one to one contacts between small scale farmers and educators as effective ways of learning drought coping. This finding showed that the farmers wanted farmer - centred learning approach. In fact, this finding was congruent Mutuke (2010), who argued that in farmer - centred learning approach, researchers see

farmers as innovators, partners and entrepreneurs; whereas farmers look at scientists to be one of the many sources of information available to them.. The findings indeed confirmed that there was need to vary the mode of teaching and that mode of teaching had to be learner centred.

#### **6.4.4 Assessment Strategies to be Used**

Small scale farmers identified field days and group discussions as ways of assessing their learning progress. The purpose of assessment in any learning process is to discover how effective the instructions have impacted on the learners and possibly improvement of the learning. Assessments strategies indicated by the farmers did not include those used in formal education like examinations and tests showing that adult learners easily get intimidated when they are questioned. This is also noted in section 3.3.1 of this document.

#### **6.4.5 Language to be used in Educating Small Scale Farmers**

The small scale farmers of Luangwa District unanimously stated in agreement that Nyanja language could be used in their educational activities. This finding was important in designing a localised environmental learning programme that would be effective and responsible to the needs of the small scale farmers.

### **6.5 Proposed Environmental Learning Programme for Drought Coping for the Small Scale Farmers of Luangwa District.**

Environmental learning programmes are an integrated sequence of planned stimulating learning experiences and materials intended to attain particular set of objectives. Environmental programmes can range from short term, long time and capacity building. An environmental learning programme proposed for small scale farmers of Luangwa district is a long term capacity building on drought coping.

#### **Aim**

To engage the small scale farmers of Luangwa District in appropriate learning activities that will result in the achievement of desired behaviours towards drought coping.

Details of the proposed programme appear in table 6.1. The main features of the programme are that it contains;

1. Themes

- drought
  - drought coping
2. Learning Strategies such as;
    - Fish Bowl
    - Discussion
    - Exchange Visits
  3. Teaching Methods such as;
    - Workshops
    - Seminars
    - Case Study
    - Talks and Presentation
    - Drama
  4. Learning Resources
  5. Learning outcomes
  6. Assessment Details
  7. Possible stakeholders;
    - Agriculture extension Officers
    - Small Scale Farmers
    - Disaster Management and Mitigation Unit
    - Child Fund
    - Japan International Co-operation Agency (JICA),
    - World Vision International
    - Royal Norwegian Development Agency,
    - Food and Agriculture Organisation
    - World Food Programme
    - Africare
    - Zambian Government.

The characteristics of target group are;

- Small Scale farmers
- Cultivates land of not more than 10ha
- Domesticate mainly goats and chickens

Table 6.1: Proposed Environmental Learning Programme for Drought Coping

Target Group	Items Description							
	Themes	Knowledge	Competences	Values	Teaching and Learning Strategies	Teaching and Learning Resources	Assessment Details	Learning Outcomes
Small scale farmers of Luangwa District	<p><b>Theme</b> Drought Hazard</p> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Causes</li> <li>• Effects of drought (The above points will offer Small Scale Farmers an opportunity to acquire knowledge, values and attitudes on drought)</li> </ul> <p><b>Key Questions</b></p> <ul style="list-style-type: none"> <li>• What is the link between drought and human activities?</li> <li>• What attitudes and values should be developed toward the environment</li> </ul>	<p>Comprehension of the following;</p> <ul style="list-style-type: none"> <li>• what drought is</li> <li>• causes of drought effects of drought on all dimensions of the environment</li> </ul>	<p>Capacity not to engage in vices that could instigate drought occurrence</p>	<ul style="list-style-type: none"> <li>• Appreciation of interdependence between human and physical environment</li> </ul>	<p><b>Body voting</b></p> <ul style="list-style-type: none"> <li>• Agriculture Extension officer will ask all Small Scale Farmers to stand.</li> <li>• Agriculture extension officer will then ask those who had stayed in Luangwa district for more than 10 years to sit until educator will come to those who had stayed in Luangwa for a year.</li> <li>• This</li> </ul>	<p><b>Flip Charts</b></p> <ul style="list-style-type: none"> <li>• These will be used by Small Scale Farmers during discussions</li> <li>• All their discussion will be recorded on flip charts</li> </ul> <p><b>Fliers</b> These will be used to provide information on effects of drought in general</p> <p><b>Projector</b> Will be used by educator for easy presentation of the content</p> <p><b>Comics Strips</b></p> <ul style="list-style-type: none"> <li>• Will be used to circulate</li> </ul>	<p>Informal, conversational interview will be conducted by Agriculture Extension Officers and World Vision International to assess Small Scale Farmers' learning</p>	<ul style="list-style-type: none"> <li>• Explain what drought is</li> <li>• Describe causes of drought</li> </ul> <p>Use a compass rose to relate human activities and drought occurrence</p>

	<p>?</p> <p><b>Stakeholders</b></p> <p><b>Government of Zambia</b></p> <ul style="list-style-type: none"> <li>• Will offer financial support</li> </ul> <p><b>Child Fund</b></p> <ul style="list-style-type: none"> <li>• Conduct education activities</li> <li>• Offer financial support</li> </ul> <p><b>Africare</b></p> <ul style="list-style-type: none"> <li>• Provide financial support</li> </ul> <p><b>Disaster Management and Mitigation Unit</b></p> <ul style="list-style-type: none"> <li>• Will provide information on policy( drought mitigation).</li> </ul> <p><b>Extension Officers</b></p> <ul style="list-style-type: none"> <li>• Will organise Small Scale Farmer to be actively involving in learning</li> <li>• Will conduct</li> </ul>				<p>activity will be used as icebreaker</p> <p><b>Talks and Presentation</b></p> <ul style="list-style-type: none"> <li>• Child fund and World Vision International will give talks on what drought and causes of drought</li> </ul> <p><b>Group Discussion</b></p> <ul style="list-style-type: none"> <li>• Exchange of ideas between learners regarding the effects of drought</li> <li>• Agriculture extension officer will moderate to allow all to participate</li> </ul> <p><b>Drama</b></p> <ul style="list-style-type: none"> <li>• A play</li> </ul>	<p>information on what drought is, causes and effects.</p> <p>Comics will be brief in nature and printed in Nyanja as one of the local language in Luangwa District</p>		
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<p>education activities</p> <p><b>World Vision International and Child Fund</b></p> <ul style="list-style-type: none"> <li>Participate in educating Small Scale Farmers</li> </ul> <p><b>Small Scale Farmers</b></p> <ul style="list-style-type: none"> <li>Learners and active participants in all learning activities</li> </ul>				<p>depicting relationship between tree cutting and drought occurrence</p> <p><b>Practical Activity</b></p> <ul style="list-style-type: none"> <li>Planting of trees</li> </ul>			
<p><b>Theme</b> Drought Coping</p> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>Conservation farming (traditional and modern)</li> <li>Growing of indigenous drought resistant crops</li> <li>Livestock farming</li> <li>Sustainable utilization of water</li> <li>Water</li> </ul>	<p>Comprehension of the following;</p> <ul style="list-style-type: none"> <li>aspects of conservation farming that addresses drought</li> <li>various drought resistant crops and early maturing seeds</li> <li>animals that survive in drought conditions</li> <li>water conservation</li> <li>water harvesting</li> <li>fish farming</li> </ul> <p>Entrepreneurship</p>	<p>Having capacity and ability to do the following;</p> <ul style="list-style-type: none"> <li>employ conservation farming correctly</li> <li>identify and grow early maturing seeds and drought resistant crops</li> <li>identify and domesticate animals that survive in drought conditions</li> <li>use water</li> </ul>	<ul style="list-style-type: none"> <li>Develop positive self-esteem</li> <li>Develop good environmentally friendly principles of farming</li> <li>Entrepreneurship</li> <li>Good principle of water usage</li> </ul>	<p><b>Dicussions</b></p> <ul style="list-style-type: none"> <li>Discussions will be used to air out views on drought coping</li> <li>Agriculture extension officer moderate discussions on different drought coping strategies</li> </ul> <p><b>Case Study</b> Out sourced video</p>	<p><b>Projector Lap top</b></p> <ul style="list-style-type: none"> <li><b>Videos</b> showing conservation methods and other drought coping strategies will be shown to Small Scale Farmers.</li> <li>This will be facilitated by the use of videos,</li> </ul>	<ul style="list-style-type: none"> <li>Field days to physically check on Small Scale Farmers' skills will be conducted by Agriculture Extension Officers to determine</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate various viable drought coping strategies</li> <li>Exhibit skills of water harvesting</li> <li>Demonstrate water conservation practices</li> </ul> <p>Show entrepreneurship skills</p>



	<p>harvesting</p> <p><b>Key Question</b></p> <ul style="list-style-type: none"> <li>• What skills should be developed in drought coping?</li> </ul> <p><b>Stakeholders</b></p> <p><b>Zambian Government</b></p> <ul style="list-style-type: none"> <li>• Give financial support</li> </ul> <p><b>Child Fund</b></p> <ul style="list-style-type: none"> <li>• Conduct training</li> <li>• Offer financial support</li> </ul> <p><b>Small Scale Farmers</b></p> <ul style="list-style-type: none"> <li>• Learners and active participants in finding solutions to drought</li> </ul> <p><b>Agriculture extension Officers</b></p> <ul style="list-style-type: none"> <li>• Will provide expertise on drought</li> </ul>		<p>sustainably</p> <p>Harvest and conserve water during floods</p>		<p>on drought coping strategies will be used as a case of discussion. Discussion will be moderated by Agriculture Extension Officer</p> <p><b>Demonstrations</b></p> <ul style="list-style-type: none"> <li>• Extension officers will demonstrate conservation farming, growing of drought resistant crops, bee keeping and fish farming</li> <li>• World Vision International will demonstrate water harvesting skills,</li> </ul> <p><b>Exchange visits</b></p> <ul style="list-style-type: none"> <li>• Small Scale Farmers to visit other</li> </ul>	<p>projector and laptop</p> <p><b>Posters</b></p> <ul style="list-style-type: none"> <li>• These will be pre-tested on a small group of Small Scale Farmers before being used in the learning activity.</li> </ul> <p>The posters will depict various drought coping strategies</p>	<p>e Smalls Scale Farmers' learning progress</p> <ul style="list-style-type: none"> <li>• Focus group discussion among Small Scale Farmers will be organized through which assessment could be made from</li> </ul>	
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	<p>resistant crops, bee keeping, fish farming, livestock farming and various aspects of conservation farming</p> <ul style="list-style-type: none"> <li>• Organise exchange visits</li> <li>•</li> </ul> <p><b>World Vision International</b></p> <ul style="list-style-type: none"> <li>• Will provide expertise on sustainable utilization of water</li> <li>• Will conduct training on water harvesting</li> <li>• Offer financial support</li> </ul> <p><b>JICA</b></p> <ul style="list-style-type: none"> <li>• Will provide input as to capacity development</li> </ul>				<p>Small Scale Farmers that seem to be doing well and vice visa.</p> <ul style="list-style-type: none"> <li>• Sharing of knowledge between small scale farmers to be done during exchange visits. This will enhance linkages between Small Scale Farmers</li> </ul> <p><b>Field days</b></p> <ul style="list-style-type: none"> <li>• Agriculture Extension Officers to follow Small Scale Farmers to their farming fields and do demonstrations on</li> </ul>			
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<p>needs</p> <ul style="list-style-type: none"> <li>• Offer financial support</li> </ul> <p><b>Food and Agriculture Organisation</b></p> <ul style="list-style-type: none"> <li>• Financial support</li> </ul>				<p>various aspects of conservation farming</p>			
<p><b>Theme</b> Mitigation Measures <b>Content</b></p> <ul style="list-style-type: none"> <li>• Bee Keeping</li> <li>• Practical skills in knitting and carpentry</li> </ul> <p><b>Key Questions</b></p> <ul style="list-style-type: none"> <li>• What enterpruener skills could help mitigate negative impacts of drought?</li> </ul> <p><b>Stakeholders</b> <b>Government</b></p> <ul style="list-style-type: none"> <li>• Will offer financial support</li> <li>• Input as to capacity building</li> </ul>	<p>Comprehension of the following;</p> <ul style="list-style-type: none"> <li>• diversification as a mitigation measure</li> </ul>	<p>Having capacity and ability to do the following;</p> <ul style="list-style-type: none"> <li>• engage in other income generating activities</li> </ul>	<ul style="list-style-type: none"> <li>• Develop positive self-esteem</li> </ul>	<p><b>Exposure Trip</b></p> <ul style="list-style-type: none"> <li>• Trips will be organised to areas where Small Scale Farmers engage in bee keeping</li> </ul> <p><b>Workshops</b></p> <ul style="list-style-type: none"> <li>• Will be conducted to demonstrate bee keeping skills, knitting and carpentry</li> </ul>	<p><b>Fact Sheets</b></p> <ul style="list-style-type: none"> <li>• Short and simple facts will be used to provide information on diversification. These fact sheets will be written in Nyanja language</li> </ul>	<ul style="list-style-type: none"> <li>• Field days to physically check on Small Scale Farmers' skills will be conducted by Agriculture Extension Officers and child Fund to determine Small Scale Farmers' learning</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate bee keeping skills, knitting and carpentry</li> <li>• Exhibit entrepreneurship skills</li> </ul>

	<p><b>World Vision Internation</b></p> <ul style="list-style-type: none"> <li>• Financial support</li> <li>• Organise and conduct training</li> </ul> <p><b>Extension Officers</b></p> <ul style="list-style-type: none"> <li>• Will organise Small Scale Farmer to be actively involving in learning</li> <li>• Will conduct training</li> </ul> <p><b>Small Scale Farmers</b></p> <ul style="list-style-type: none"> <li>• Learners and active participants in coming up with mitigation measures</li> </ul> <p><b>JICA</b></p> <ul style="list-style-type: none"> <li>• Will offer financial support</li> </ul> <p><b>Child Fund</b></p> <ul style="list-style-type: none"> <li>• Conduct training</li> <li>• Offer financial support</li> </ul>				<p><b>Story</b></p> <ul style="list-style-type: none"> <li>• Extension officers will tell a bee keeping story to arouse Small Scale Farmers' interest in bee keeping.</li> </ul> <p><b>Practical Activity</b></p> <ul style="list-style-type: none"> <li>• Planting of drought resistant trees</li> </ul>		<p>progress</p> <ul style="list-style-type: none"> <li>• Focus group discussion among Small Scale Farmers will be organised through which assessment could be made from</li> </ul>	
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	<p><b>World Vision International</b></p> <ul style="list-style-type: none"> <li>• Provide financial support</li> </ul> <p><b>Royal Norwegian Development Agency</b></p> <ul style="list-style-type: none"> <li>• Provide financial support for dam construction</li> </ul> <p><b>World Food Programme</b></p> <ul style="list-style-type: none"> <li>• Will offer finances for dam construction</li> </ul>							
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## **6.6 Summary**

The chapter discussed the finding in the order presented and extant a designed environmental learning programme for drought coping. The chapter started with an overview of the discussion followed by individual sections. In congruent with research objectives and with guidance from literature review, conceptual and theoretical frameworks, the chapter discussed drought coping strategies employed by small scale farmers of Luangwa district. Further, the chapter discussed environmental learning for drought coping.

It can thus be contended that the present study has brought out some insights and new knowledge on drought coping strategies and environmental learning for drought coping as all objectives were addressed. The next chapter deals with conclusion, recommendations and further research recommendations.

## **CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS**

### **7.1 Introduction**

This chapter provides the conclusion and recommendations. Implications of the results for future research and suggestions on areas for future research and interventions are also given.

### **7.2 Conclusion**

The study brought out important points concerning environmental learning for drought coping and drought coping in Luangwa District of Lusaka Province of Zambia. The study established that Extension Officers from the Ministry of Agriculture and officers from Child Fund utilised an agriculture integrated approach in educating small scale farmers. Further, the study established that an integrated approach to agriculture focused on general farming practices and not specifically on drought coping.

The study also revealed that limited methods of teaching were used by the educators under the integrated approach. In terms of assessments, no assessments were done to inquire into the learning process. However, the study seems to suggest that teaching methodology, assessment strategies all played an important role in enhancing learning. Since Luangwa District is a drought prone area as documented by small scale farmers relied on traditional drought coping strategies learnt from parents. It was however discovered that traditional drought coping strategies employed by small scale farmers of Luangwa District were ineffectual. Consequently, small scale farmers resorted to food begging and relief food from the government and other well - wishers. Aspects of begging for food and asking for relief food is also illustrated in section 1.1 of this document.

With regard to the above situation, it can be conclusively stated that environmental learning for drought coping among small scale farmers of Luangwa District was superficial in nature.

### **7.3 Recommendations**

In order to enforce environmental learning for drought coping among the small scale farmers of Luangwa district, the following recommendations may have to be taken into consideration:

#### **Ministry of Agriculture and Others Educators**

1. The findings of this study showed that general farming practices were taught to small scale farmers . Arising from this, the content should be revisited so that more on drought coping is incorporated.

2. The findings indicated that small scale farmers utilised mainly traditional coping strategies. In view of such findings, there is need to incorporate different ways of knowing into curricula to bring together participatory and other learning approaches for small scale farmers. Environmental learning for drought coping should be a melting point of different knowledge systems and sources such as traditional and modern science. This will enhance localization of the curriculum and make learning relevant.
3. Another finding was that, there were no visible teaching materials in place. There is need therefore to embark on educational material development.
4. The study findings revealed that small scale farmers rarely shared information on drought coping amongst them. Arising from this, educators could provide an enabling environment for small scale farmers to form local learning forums for the sole purpose of sharing knowledge and experiences.

#### **The Zambian Government and Co-operating Partners**

5. The study established that small scale farmers were vulnerable to drought because of their economic status. In this regard, safe nets could be put in place so that the small scale farmers' learning could be relevant.
6. The study findings suggested that more learning and teaching materials would be needed. Arising from this, more funds should be allocated to extension services.
7. The study also established that educational activities only took place when funds were available to conduct such activities. There was need therefore to increase funding allocated to farmer learning activities.

#### **7.4. Reflection on the Research Process**

This section gazed on the research process. It addresses aspects such as knowledge extended by the study, contextual relevance of the study to the field of environmental education, challenges encountered during the study, and future studies.

##### **7.4.1 Knowledge Extended by this study**

In addressing the research questions of this study, the frameworks and research approaches used complimented each other, thus they correlated well. The findings showed that educators taught general farming practices to small scale farmers of Luangwa District, which made it difficult for the learners to isolate drought coping components from that form of learning. Thus, it was established that environmental learning for drought coping could enhance the



relevance of learning than knowledge on general farming practices. In order to implement environmental learning for drought coping among the small scale farmers of Luangwa District, it was found that an environmental learning programme for drought coping would be ideal and thus an environmental learning programme was proposed. In addition, it appears this study has shown a link between environmental learning and drought coping and it has provided for a solution towards drought coping. Furthermore, the volume of the literature on environmental learning and drought coping has been broaden.

#### **7.4.2 Contextual Relevance**

As illuminated in section 6.3.4 of this thesis, learning about general farming practices may not help in addressing challenges that emanate from drought. Learning among small scale farmers of Luangwa district must be situated in the context of drought coping. This would promote learning that is responsive to the local context thus promoting sustainability. Recommendations made during the Environmental Education Conference held in Ahmadabad-India contended for broader social and cultural situated learning processes that take into account context (UNESCO, 2007). Furthermore, section 1.2 of Ahmadabad recommendations, argued that in order to make Environmental Education relevant, it should also be able to prepare people to live with (cope) risky environments (UNESCO, 2007). It was against this background that this study was located in the context of the Ahmadabad recommendations and consequently, Environmental Education.

#### **7.4.3 Challenges Encountered**

Like any other study, there were challenges encountered during the process of this study. Small scale farmers of Luangwa District were not conversant with English language. Thus the researcher had to look for an interpreter who was conversant in both English and Nyanji languages to help with translations. Further still, the researcher did not have an opportunity to observe small scale farmers' learning processes to get more acumen into learning processes. The researcher learnt that learning sessions for small scale farmers were only conducted when finances are available for such activities. Unfortunately, at the time of the study, educators were not sure as to when the finances were available for those educational activities. Thus on the aspect of small scale farmers' learning processes, the researcher relied more on data from interviews, focus group discussions and small scale farmers' farming competences to get more insights into small scale farmers' learning processes.

#### **7.4.4 Suggested Further Research**

The researcher suggests the following;

1. another study be conducted on small scale farmers learning processes for drought coping to enhance validity of the conclusion reached.
2. another research be conducted on the implementation of the suggested environmental learning programme and assess its impact.
3. It is also proposed that future studies should translate the research instruments in local languages in order to ensure participants understand issues very well.

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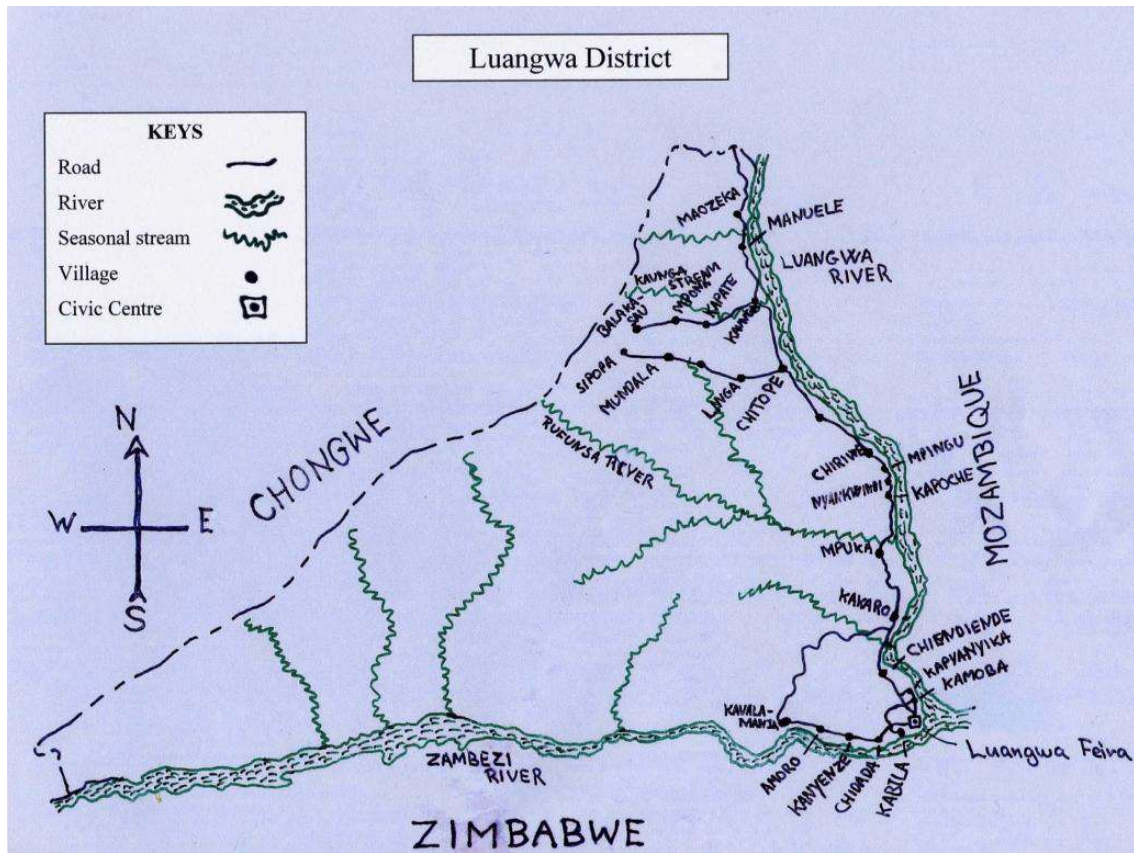
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# APPENDICES

Appendix 1: Map of Luangwa District



(Source: Luangwa Report, 2008)

## Appendix 2: Interview Guide for Drought Management Managers/Educators

Date.....

Name of Institution.....

Position Held.....

Sex.....

### *Questions*

1. What have you been trained in?
2. Which institution trained you?
3. What are your institution guidelines on disaster management/ mitigation?
4. Does such guideline include environmental learning on natural hazards?
5. Does your institution offer environmental learning on how to cope with drought?
6. Is your teaching specific to a particular hazard experienced by the target group?
7. How involved are the learners in the teaching and learning activity?
8. What modes of teaching do you use?
9. What methods do you employ?
10. What methods are used to evaluate the learning and teaching activity?
11. How environmentally aware are the people on drought?
12. Is there anything else you'd like to say about small scale farmers' learning?

### Appendix 3: Responses of a Focus Group Discussion

#### Location of Discussion: Luangwa District

#### Involved participants: Small Scale Farmers

Lillian: Thank you for agreeing to participate in this focus group discussion.

Participant 1: *Ukambila onse mugulu ino, ndikuti zikomo* (Thank you on behalf of the group).

Lillian: Those of you who have stayed in Luangwa District for more than 10 years please raise up your hands.

Lillian: Those of you who have stayed in Luangwa District for less than two years raise up your hands.

Lillian: I can see that none of you has stayed in Luangwa District for less than one year.

Lillian: What is your understanding of the term drought?

Participant 5: *Chilala ni kusinta kyanyengo*. (Drought is change of time).

Participant 3: *Chilala nikusoba kwa mvula koma kutentha kotelo kuti zomera zimafota*. (Drought is lack of rainfall with high temperatures such that plants wither away).

Participant 1: *Kusinta kyanyengo ndi climate change*. (Change in time is climate change).

Lillian: What do you think are the causes of drought?

Participant 4: *Mitengo zambili zitemewa kumusinje wa Luangwa. Icho cimallengesa kukhale chilala*. (Most trees have been cut along the Luangwa River and this causes drought).

Participant 2: *Mwamene niganizila, chilala cimambwela na kusinta kwanyengo*. (My thinking is that drought is caused by climate change).

Lillian: Do you think you are susceptible to drought?

Participant 3: *Ndife anthu ofoka ku chilala* (We are vulnerable to drought).

Lillian: Why do you think you are vulnerable?

Participant 5: *Ndife anthu ofoka ku chilala chifukwa tivutika, tili na umphawi*. (We are vulnerable to drought because we are poor people).

Participant 2: *Sitingakwanise kukhala ndi zipangizo zothilira ndiponso tilibenso mosungila manzi chifukwa tilibe ndalama zogulira zinthiizi*. (We cannot afford to install irrigation systems and we don't have water storage facilities because we don't have the money to buy those things).

Participant 4: *Ndife anthu ofoka kuchilala chifukwa tili na umphawi ndiposo kuno kwathu ku Luangwa ni ku Vale.* (We are vulnerable to drought because we are poor and that Luangwa district is a valley).

Lillian: What problems does drought gives you in connection to farming?

Participant 2: *Chilala chikapitilira chimalengesa matenda yakusowa kwa chakudwa kwa ana, kulema msanga ndi matenda ena.* (Drought causes an increase in malnutrition cases among children, fatigue, epidemics and various ailments).

Participant 3: *Kuchepokela kwa chakudya mu nthawi ya chilala kumalengesa kuchepela kwa mphamvu mu thupi zochingiliza kumatenda osiyana siyana.* (Insufficient food during drought episodes results in compromised immunity system which capitulated into various ailments).

Participant 5: *Chilala chimalengesa kuchepa kwa maazi.* (Drought causes water scarcity).

Participant 6: *Kulimbilana kwa mauzi kumayamba kwa alimi a minda zinong'ono.* (Fight over water source erupts among small scale farmers).

Participant 1: *Ukhalilo umavuta chifukwa timakhala tilibe kosungula zinthu.* (Situation is even worsened because we don't have storage facilities).

Participant 1: *Zilombo monga tudoyo tumabwera munthawi ya chilala na kudya zolimidwa zimene zikali moyo.* (A lot of insects called aphids come with onset of droughts and they eat all few surviving crops).

Participant 4: *Tudoyo twamene utu tumavuta kutupisha na kutusiliza.* (These aphids are difficult to manage because a farmer cannot get rid off).

Participant 2: *Kulibe chakudwa cha anthu ndi nyama.* (There is no food for both animals and food).

Participant 4: *Chilala chimaleta anjala njala pakati pa nyama zosungidwa.* (Drought causes starvation among our domestic animals).

Participant 6: *Kuloka kwa mvula ku Luangwa kumabwela mvula iyenda mukusila. Mongo chino chaka inabwela mukusila kwa malichi.* (Sometimes rainfall in Luangwa comes towards the end of rain season. This year, it came towards end of March).

Participant 3: *Chilala chimapangisa umphawi kupitilira chifukwa tilibe zolima zogulisa kuti tipezeko ndalama zogulira zinthu zina zofunikiramonga ndalama za sukulu fataleza, zolimila monga khasu ndi zina.* (Drought causes poverty levels to be high because we do not have excess crops to sell so that money is raised for other needed things like children's school fees, fertilizers and farming tools e.g. hoes).

Participant 1: *Chilala chimaonanga mbeu zolimidwa.* (Drought impact negatively on crops).

Participant 2: *Mbeu zimene timalima zimaonongeka mu chilala.* (Most of the crops that we grow wither away during drought episode).

Participant 4: *Chilala chimalengesa anthu ena kukolewa ndi mowa.* (Drought makes some to be drunk).

Lillian: How does drought make people drunk?

Participant 2: *Mowa opandidwa ndimasau imalengesako anthu kuiwalako pa za njala nichifukwa chake anthu ambili amamwa mowa wa masau.* (Masau brewed beer offers a temporal distracting from the feeling of hunger hence a lot more people drink masau brewed beer during drought episodes).

Lillian: Do small scale farmers have the money to buy beer?

Participant 2: *Mowa wa masau niwapafupi kupanga ndiponso anthu samalipira ndalama kuti amwe.* (Masau brewed beer is easy to brew thus the drunk don't spend money on it).

Lillian: How do you cope with drought?

Participant 1: *Benangu bama gulisa somba zamumana wa Luangwa.* (Some sell fish harvested from Luangwa River).

Participant 4: *Anthu ena amapanga mphasa ndi zipangizozina zonyamuliramo zinthu zimene amagulisa kuti apezeko chakudya.* (Others make mats and baskets which they sell to raise money for food).

Participant 2: *Ife amene tili ndi mbuzi na nkuku, timagulisa zina mwaizi, kama ngati chilala chachilamo, timagulisa zonse pamodzi.* (For these of us who have goats and chickens, we sell some of them but when drought is severe, we sell all our domestic animals).

Participant three 3: *Anthu ena amaphika mowa wamene amagulisa kuti apezeko ndalama zogulira zakudya ndi zinthu zinazofunikira.* (Some brew beer which is sold to raise an income for food and other necessities).

Participant four 4: *Ngati chilala chachilamo, timatenga delele ya musanga mpunde ndi busala yamene timadya kulibe nshima.Ndi chovuta kupeza unga.* (When drought is severe we harvest wild okra (mpunde) and wild yam (busala) which we eat without nshima. It is so hard to find mealie).

Participant 2: *Tishanga milisi kuti tikatengemo unga.Ngati kuli chilala chikulu, milisi siyimakhalako chokonkhapo, kumakhala kulibe unga. Tinafuna kufa na njala chaka chino.* (We grow maize for mealie-meal. So when there is severe drought, maize doesn't survive hence no mealie meal. We almost died of hunger this year).



Participant 5: *Munthawi yachilala, timatenga masua na mabuyu.* (During drought episodes, we also gather masau fruits and mabuyu (baobab fruit)).

Participant 6: *Anthu amene ali minda kufupi ndi msinje wa Luangwa, amayenda kuja nakukumba pansa; naku shangapo mbuto za milisi zokwanila 20 mokumbidwa mwamemo. Koma chaka chino, na milisi yamene yinashangidwa mokumbikamo yinaonongeka na zuwa.* (Those who have farming portions near Luangwa River, go to the banks of Luangwa River and dig up big holes and plant about 20 maize seeds in those holes. But this year, even the maize crops planted in those holes withered because of too much sunshine).

Participant 2: *Ngati cacilamo, tumapempa chakudwa.* (When severe, we beg for food).

Participant 1: *Ngati chilala cacilamo, tumapempa chakudwa* (when drought is severe, we beg for food).

Lillian: Do you get any Education on Drought Coping from any other organisation?

Participant 1: *Bamatupunzisa ba officer kuchoka kwa agriculture saulimi.* (Only Extension Officers from ministry of Agriculture teach us on farming).

Lillian: What topics do Extension Officers cover in your learning process?

Participant 4: *Tupunzila tutoso cabe* (We learn on moisture conservation only).

Lillian: How do you then learn about Drought Coping?

Participant 3: *Tiziwa mokhalira mu chilala chifukwa makolo athu anatiphunzisa kale mokhalila* (We learn drought coping strategies through information that was passed on from our parents).

Lillian: Do you share the information among yourselves on Drought Coping and Farming in General?

Participant 5: *Sikambili pomwe tima masulilana za nkhani* (We rarely share information amongst ourselves).

Lillian: What do you think are solutions that can mitigate problems emanating from Drought?

Participant 1: *Tifuna solar irrigation.* (We need solar irrigation).

Participant 2: *Anatiuza kuti azapanga dam koma siyinachitike. Ni nkhani cabe yapa pepala.* (We were promised a dam but that has not materialised. It is just on paper)

Participant 3: *Ndichofunikira kuti boma yipange dam kuti yitithandize kuthilira ndiponso kumbuyoku nili zokamba kuti apange dam koma siyinachitike.* (There is need for government to construct dams that could help with irrigation and that there been talks in the past about dam construction but that has not materialised).

Participant 4: *Boma ndi anthu ena angayambe kuphunzisa anthu pa za kusoka ndi kupanga kuti anthu apazeko zocita.* (The government and other well-wishers can introduce courses on sewing and knitting. Sewing and Knitting can be another income generating activity).

Participant 6: *Tifunako na tumaloan kuti tizigula ma mashini yotungila ndi zinthu zina zofunikira pakutunga.* (But we need soft loan so that we could buy all sewing machines and other things needed in sewing and knitting).

Participant 2: *Angatiphunzisenso mosungula nzimu kuti uchi tikagulisa uziti thandizako kuchila ku chetekela muzaulimi chabe.* (We could also be trained in bee keeping so that harvested honey can expand their income base than depending solely on agriculture).

Participant1: *Kufunika maphunzilo ambiri paza ukhaliro wamu chilala.* (There is need for more education on drought coping).

Lillian: What topics would you like to be covered in Environmental Learning for Drought Coping?

Participant 1: *Kuphunzidwa ndichabwino molimila mbeu zosiyanasiyana.* (Learning would be beneficial if we are taught on good ways of growing different kind crops).

Participant 2: *Na kuvuta kwa mvula, chingakhale chabwino kuphunzidwe pa mbeu zolima mu chilala.* (With irregular rains, it would be good to know types of crops that would grow and survive during drought). Other small scale farmers generally agreed to the issue of crop production

Participants 3: *Nyama zathu sizichita bwino. Kuphunzidwa mosungila nyama monga mbuzi na ng'ombe kungathandize kwambili.* (Our animals have not been doing well. Education on how to do rear animals like goats and cows would help them a lot).

Participant 4: *Kuphunzidwa mosungila nkuku nako kungathandize kupeza ndalama za sukulu ndi zinthu zina.* (Learning on how to take care of chickens would help us have another business that may help raise money for for school going children and other things).

Participant 6: *Kusunga nzimu ndi chigawo chimozi mwamene tingaphunzidwa.* (Bee keeping is another area we need to be educated in).

Participant 1: *Kusunga nzimu kungathandize kuleka kuchetekela mu ulimi.* (Bee keeping would help reduce reliance on farming).

Participant 2: *Kuphunzidwa pa zakasungidwe ka nsomba nako kungathandize.* (Fish farming could be an income generating activity and source of food).

Participant 3: *Tifina kuphunzidwa pa mosungila nsomba.* (Education on fish farming could help a lot).

Lillian: What Mode of Teaching would you like the educators to use in Environmental Learning for Drought Coping?

Participant 1: *Tifuna ma radio programme chifukwa ngakhale kuti ophunzisa adwala tingamvelere ku radio na kuphuuzira pa zochita* .(We want radio programmes because even if an extension is sick and he is not able to attend to us, we could still listen to the radio and be able to learn).

Participant 4: *Tifuna zotandalirana ziyambiko*.(We want exchange visits to be introduced).

Participant 6: *Kulibe nkhani zotandalirana kuno ku Luangwa. Ophunzisa za ulimi atiuza kuti kulibe ndala pa za kutandalirana. Kutangalirana ndikwabwino pa kuphunzila kwa wina ndi muzache*. (There are no exchange visits here in Luangwa District. Extension officers tell us that no money for exchange visits. Exchange visit are important ways of learning from others).

Participant 2: *Kuphuzisidwa ndi kutandilira minda ndi kwabwino ndiponso tivifuna na ife*. (Field days and any form of training are also important and thus we want them also).

Lillian: What Assessment Strategies would you like to be used in Environmental Learning for drought coping?

Participant 5: *Chingakhale bwino kuti ophunzisa zaulimi atibwelese pamozi ndiponso mulimi aliylene akambepo mwamene alimila kuti tiphunzisane patekha ndiponso ophunzisa angayesa alimi onse amene alipo*. (It would be good for educator to bring us together and each farmer to give their experiences on farming so we could learn from each other and later educator assesses the progress of all farmers present).

Participant 1: *Ophunzisa aziona mwamene tilimila na kutiyesa pa zinthu zimene timachita mu minda yathu*. (Educators should be checking on our progress and be able to assess us from the progress we have made in our farming fields).

Lillian: What Language would you like to be used in Environmental Learning for Drought Coping?

Participant 1: *Tifuna kuphunzidwa mu chinyanja kuti timvese mokwanila zimene tizaphunzidwa. Tisewensela chinyanja pa kukambisana kuno, so ndiye chilankhulidwe chimene timvela bwino*. (We want to be taught in Nyanja Language so that we understand clearly what we will be taught. We use Nyanja for communication so it is the most ideal language for us).

Lillian: Is there any one of you who would like to add on what has already been said on the issue of Drought and Learning?

Participant 5: Yiyayi.

Participant 1: Yiyayi.

Lillian: Thank you so much for participating in this discussion.

## **Appendix 4: Semi Structured Observation Guide**

### **Small Scale farmers**

- All activities during drought episodes

### **Physical Environmental**

- Physical inspection of farm holdings
- Observation of gestures made by respondents during interviews and focus group discussion

## **Appendix 5: Information Sheet for the Participants**

### **Research Title**

Environmental Learning for Coping with Drought among Small Scale Farmers of Luangwa District, Zambia.

**Name of the Principal Researcher:** Chipatu Lillian

**Institution of the principal Researcher:** University of Zambia, School of Education,

**Affiliation/Status of the Principal Researcher:** Student of degree of doctor of philosophy Environmental Education.

### **Purpose of the study**

We invite you to participate in a study of examining environmental learning for Drought Coping among small scale farmers of Luangwa District.

The main objective of this study is to come up with proposed educational measures to address drought.

### **Procedures**

Specifically, we are going to do an interview which should take less than an hour. The information that you will provide during the study will be kept confidential. Only the research assistant and researcher will have access to the responses. The information will be destroyed after the study.

### **Benefits**

Your participation in this study is voluntary and you have the right to withdraw your participation should you feel uncomfortable.

### **Confidentialities**

All information collected throughout this study will be kept confidential. However, the details resulting from this study will be used to complete this report and be disseminated to Ministry of Agriculture and University of Zambia.

### **Contact Person**

Please feel free to contact the persons below at any time, if you have any questions about participating in this study.

**For questions about your rights as a research subject, contact the following:**

### **The Chairperson**

Chairperson of the Research Ethics Committee,

UNZA Research Ethics Committee

PO BOX 32379 Lusaka, Zambia.

**For questions about this study or a research**

Chipatu Lillian [Dip(Ed), BA. Ed, Masters in Environmental Education]

School of Education

Department of Language and Social Sciences Education,

PO Box 32379 Lusaka, Zambia.

Mobile No: 0977377513

E-mail: [lilly.chipatu@gmail.com](mailto:lilly.chipatu@gmail.com)

## Appendix 6: Ethical Clearance Letter



### THE UNIVERSITY OF ZAMBIA DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

#### HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

Telephone: 290258/293937  
Fax: +260-1-290258/293937  
E-mail: drgs@unza.zm  
IRIS: 00006464  
KORCI: 00005376

P O Box 32379  
Lusaka, Zambia  
Your Ref:  
Our Ref:

20<sup>th</sup> October, 2015

Dear Ms Lillian Chipatu,

Re: **APPLICATION FOR ETHICAL CLEARANCE**

Reference is made to your application for ethical clearance for your proposed study entitled "Environmental learning for coping with drought among small scale farmers of Luangwa District, Zambia".

As your research project does not contain any ethical concerns, you are hereby given an exemption from full clearance to proceed with your research.

**ACTION:** APPROVED  
**DECISION DATE:** 12<sup>th</sup> October, 2015  
**EXPIRATION DATE:** 11<sup>th</sup> October, 2016

Please note that you are expected to submit to the Secretariat a Progress Report and a copy of the full report on completion of the project.

Finally, and more importantly, take note that notwithstanding ethical clearance given by the HSSREC, you must also obtain authority to conduct this research from other relevant institutions in Zambia such as the Ministry of Agriculture, Fisheries and Livestock, the local government leadership and local traditional leadership in the area in which you will be conducting your research.

Yours sincerely

Dr. Mildred Nkolola-Wakumelo  
**CHAIRPERSON, HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS  
COMMITTEE**

cc Director, Directorate of Research and Graduate Studies  
Assistant Director, Directorate of Research and Graduate Studies



## Appendix 7: Consent for Participation in Interview research

1. I volunteer to participate in the research project conducted by Ms. Chipatu Lillian from the University of Zambia. I understand the project is designed to collect data for academic purposes. I will be one of the people being interviewed/ participate in focus group discussion for this research.
2. My participation in this project is voluntary. I understand I will not be paid for participating in this project. I may withdraw or discontinue any time without penalty. If I feel uncomfortable during interview, I have the rights to decline to answer any question or end the interview.
3. Participation involves been interviewed by the researchers from the University of Zambia, notes will be written during interview, photos will be taken, audio tape of interview and subsequence dialogue will be make. If I don't want to be tapped, I will not be able to participate in the study.
4. I understand that the researcher will not identify me by my name in any reports using information obtained from this interview, and that my confidentially as a participant in this study will remain secure.
5. I understand that this research has been reviewed and approved by the ethics committee of the University of Zambia. For research questions or questions regarding subjects, Humanities and Social Sciences Ethics Committee of the University of Zambia through chairperson ethics on +260-290258 could be contacted.
6. I have read and understood the explanations provided to me. I have all my questions answered to my satisfaction, and I voluntary agree to participate in this study.
7. I have been given a copy of this consent form.

.....

My signature

Ms Chipatu Lillian 

31-03-16

Date

31-03-16