

THE SOCIO-ECONOMIC EFFECTS OF
DROUGHT AND HUMAN RESPONSE:
THE CASE OF MONZE DISTRICT,
1970-2003

BY

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DECLARATION

I **CHIFUWE EUCRESS** declare that this dissertation is my own work and that it has not previously been submitted for a Master of Science Degree in Geography (M.Sc.Geog.) at the University of Zambia

Signature.....*Chifuwe Eucress*.....

Date.....*05/07/07*.....

DEDICATION

To my wife Ivy and children Mwewa and Chipego whose devotion and support have never failed. I will always live to love you.



THE UNIVERSITY OF ZAMBIA

APPROVAL

THIS DISSERTATION BY EUCRESS CHIFUWE ENTITLED: "THE SOCIO-ECONOMIC EFFECTS OF DROUGHT AND HUMAN RESPONSE: THE CASE OF MONZE DISTRICT, 1970 - 2003." IS APPROVED AS FULFILING THE PARTIAL REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN GEOGRAPHY OF THE UNIVERSITY OF ZAMBIA.

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ABSTRACT

Drought has been one of the world's greatest mysteries, and it continues to have many puzzling features. It has been a part of our environment since the beginning of recorded history and humanity's survival may be testimony only to its capacity to endure this climatic phenomenon. Recent droughts in Africa have drawn so much attention of the whole world because of unexpected resultant socio-economic consequences. In Zambia drought has affected a substantial part of the country which has brought about a greater awareness of our dependence upon and the need to conserve water. Monze district is one of the areas that are seriously hit by drought in Southern province, where there are massive crop failures and livestock losses. It is hoped that local communities will seriously embark on other possible adaptive responses to the chronic phenomenon because it costs the district lots of money and man-hours meant for serious development programmes. The knowledge obtained would be useful to planning authorities especially in agricultural and water supply sectors.

The objectives of this study were to (a) assess the socio-economic effects of droughts; (b) determine the range of responses to drought by social groups in the study wards; (c) assess the role of Non-Governmental Organizations (NGOs) in helping local communities through drought related mitigation strategies; (d) assess the impacts of food for work projects on the community livelihood systems in the study wards.

The methods of data collection were open-ended questionnaires for households and local authorities; focus group discussions; and desk research from government departments and non-governmental organizations. Primary data were obtained from households and non-governmental organizations using questionnaires and through Focus Group Discussions (FGDs). Rainfall data were from meteorological office monitoring stations for 1970-2003. Data for livestock sales and cattle mortality were obtained from Ministry of Agriculture and Co-operatives, Monze district annual reports for 1980-2003. Other secondary data were from NGOs and Monze Diocese annual reports for 1992-2003. Using time series, correlation and drought severity index, several meteorological and agricultural droughts parameters were analysed. Statistical analysis was performed in order to infer some properties of the population and rainfall series for drought assessment.

The analysis of precipitation data revealed that Monze has a history of recurring drought. A detailed examination of the effects of droughts in study wards indicates that the economic sector affected is agriculture, particularly subsistence crop and livestock production. The loss of livestock due to deaths and enforced sales revealed between 1980 and 2003 was a huge burden to be carried by an already weak rural economy. An analysis of time series showed that livestock sales reduced while cattle mortality increased in years of droughts. Correlation analysis indicates that there is insignificant relationship between annual rainfall and cattle mortality. Because of the devastating effects of droughts of the 1980s, 1990s and 2000s, households responses were characterized by increased reliance on government, donors and non-governmental organizations in form of drought relief. The positive effects of the recent droughts in

Monze district were the food for work projects which were self-help schemes that benefited entire communities.

It is concluded that droughts have had a long-term effects in Monze district because vital long-term agricultural capital for peasant farmers, particularly draught animals were lost. Also, a more complete understanding of local responses to risk in drought conditions is clearly essential if more effective drought relief and mitigation strategies are to be designed. Much emphasis has been laid on short-term measures thus neglecting long-term ones which are more effective in containing drought. Some possible solutions to problems of drought in Monze district are proposed.

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TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
DEDICATION	v
ACKNOWLEDGEMENTS	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES	xii
OPERATIONAL DEFINITION OF TERMS	xiii
LIST OF ACRONYMS	xiv
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the study.....	1
1.2 Statement of the problem.....	2
1.3 General objective of the study.....	3
1.4 Specific objectives.....	4
1.5 Hypothesis.....	4
1.6 Research questions used in this study.....	4
1.7 Significance of the study.....	4
CHAPTER TWO: LITERTURE REVIEW	6
2.1 Types of droughts.....	6
2.2 Drought and Famine.....	8
2.3 Drought occurrence.....	8
2.4 Effects of droughts.....	9
2.5 Human Responses/Adjustments to droughts.....	13

CHAPTER THREE: DESCRIPTION OF STUDY AREAS.....	18
3.1 Location.....	18
3.2 Study wards.....	18
3.3 Climate.....	18
3.4 Soils.....	21
3.5 Vegetation.....	22
3.6 Geology and drainage.....	22
3.7 The socio-economic conditions of study wards...	23
 CHAPTER FOUR: METHODOLOGY.....	 24
4.1 Data sources.....	24
4.2 Sampling procedure.....	24
4.3 Selection of study wards.....	25
4.4 Analytical methods.....	25
4.5 Run duration	26
4.6 Drought severity index	26
4.7 Limitations of the study.....	26
 CHAPTER FIVE: ANALYSIS AND RESULTS.....	 28
5.1 Characteristics of respondents in study wards.....	28
5.2 Agriculture in study wards.....	28
5.3 Drought a regular occurrence in Monze.....	30
5.4 A brief history of drought in Monze	34
5.5 The socio-economic effects of drought.....	35
5.6 Correlation analysis.....	40
5.7 Household response to warning against drought.....	42
5.8 Coping measures before relief food.....	42
5.9 Food relief programme.....	45
5.1.0 Food for work programme.....	46

5.1.1	Criticism of food for work programme.....	49
5.1.2	Obstacles to effective planning for drought in Monze district..	50
CHAPTER SIX: DISCUSSION OF RESULTS.....		51
6.1	Drought occurrence and severity.....	51
6.2	Agriculture activities.....	51
6.3	Drought socio-economic effects.....	52
6.4	Correlation of rainfall and cattle deaths	53
6.5	Response to drought effects.....	53
6.6	Food relief programmes.....	55
6.7	Food for work programme.....	55
6.8	Obstacles to effective planning for droughts.....	56
6.9	Achieved objectives.....	56
CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS		58
7.1	Conclusions and summary.....	58
7.2	Recommendations.....	60
REFERENCES.....		63
APPENDICES		66

LIST OF TABLES

Table 1	Government and external support in the provision of various water supply systems in Zambia between 1992 and 1994.....	16
Table 2	Drought indices for study wards from 1970 to 2003....	31
Table 3	Droughts with greatest effects in study wards	32
Table 4	Chronology of droughts in Monze.....	35
Table 5	Livestock export for slaughter or sale out of Monze District.....	38
Table 6	Bivariate correlation coefficients between rainfall and cattle mortality	41
Table 7	Partial correlation coefficients between rainfall and cattle mortality while cattle sales are controlled	41
Table 8	Response by households if warning was given of an impending drought.	42
Table 9	Activities carried out by households during drought periods before relief food programme.....	43
Table 10	Food for work projects carried out by households in Ufwenuka, Monze and Bweengwa wards.....	47

LIST OF FIGURES

Figure 1	Types of droughts	6
Figure 2	Map of Monze District.....	19
Figure 3	Location of study wards in Monze district	20
Figure 4	Zambia's mean annual rainfall (mm).....	21
Figure 5	Pie chart showing household marital status.....	28
Figure 6	Livestock kept and crops grown by households in study wards.....	29
Figure 7	Annual rainfall (mm) for study wards from 1970-2003.....	33
Figure 8	Cattle mortality and sales from 1980-2003 for Monze district.....	36
Figure 9	Trend analysis on livestock sales based on observed and 5- years moving averages, 1980-2003.....	36
Figure 10	Trend analysis on cattle mortality based on observed and 5- year moving averages, 1980-2003.....	37
Figure 11	Trend analysis on cattle sales 5- year moving averages, 1980-2003.....	37
Figure 12	Divided circle with calculation showing households livestock losses	39
Figure 13:	Divided circle with calculation showing effects of food relief programme on household food availability.....	45
Figure 14	Divided circle with calculation showing relief food distribution methods	48

LIST OF APPENDICES

A1	Household questionnaires.....	67
A2	Local authorities questionnaires.....	69
A3	Guidelines for focus group discussions.....	71
B1	Annual rainfall for study wards 1970-2003.....	72
B2	Annual rainfall, cattle mortality and cattle sales for correlation analysis (1980-2003).....	73

OPERATIONAL DEFINITION OF TERMS

Agricultural drought occurs when rainfall amounts and distribution, soil water reserves and evaporation losses combine to cause crop or livestock yields to diminish markedly.

Correlation is the assessment of the relationship or degree of association between variables.

Drought is the extended period of dry weather of sufficient duration to cause widespread crop failure, death of livestock, water crisis and personal hardships.

Drought Index is normalized maximum departure of annual rainfall from long-term mean (normalized with a mean of zero and standard deviation of one).

Drought Severity Index is the normalized maximum cumulative departure of annual rainfall from long-term mean.

Meteorological drought occurs when rainfall is well below expectation in any large area for an extended period.

Responses are choices or initiatives taken by individuals to mitigate the effects of drought.

Run duration is the time in years between successive failures from normal.

Time series is a set of quantitative data arranged in their order of occurrence and allows the analysis of the different components of the variation in time.

LIST OF ACRONYMS

AAS	African Academy of Science
AFC	Agricultural Finance Company
BC	Before Christ
BP	Before Present
CARE	Cooperation America Relief Everywhere
CP	Chikuni Parish
CSO	Central Statistical Office
DAPP	Development Aid from People to People
EEC	European Economic Community
FAO	Food and Agriculture Organization
FFA	Food For Asset
FFF	Food For Free
FFW	Food For Work
FGD	Focus Group Discussion
IAHS	International Association of Hydrological Sciences
IRDP	Integrated Rural Development Programme
IUCN	International Union for Conservation Nature
LIRDF	Luangwa Integrated Development Fund
MACO	Ministry of Agriculture and Co-operatives
MAFF	Ministry of Agriculture, Food and Fisheries
MAWD	Ministry of Agriculture and Water Development
MDAD	Monze Diocese Agriculture Development
MHCC	Monze Home Craft Center

MP	Monze Parish
NGO	Non-Governmental Organization
NORAD	Royal Norwegian Development Agency
PAM	Programme Against Malnutrition
PPM	Programme to Prevent Malnutrition
PUSH	Peri- Urban Self Help
RRA	Rapid Rural Appraisal
SNV	Stichting Nederlandse Vrijwilligers
SPSS	Statistical Packages for Social Sciences
UNICEF	United Nations Children Emergency Fund
UNZA	University of Zambia
VDC	Village Development Committees
WFP	World Food Programme
WMO	World Meteorological Organisation
ZCA	Zambia College of Agriculture
ZCSC	Zambia Cold Storage Company
ZMD	Zambia Meteorological Department

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Drought has been one of the world's greatest mysteries, and it has continued to have many puzzling features since the beginning of recorded history. It is one of the world's worst natural afflictions whose occurrence is imperceptible and indefinite. There is no universally accepted definition of drought but for the purpose of this study, drought is a period of dry weather of sufficient duration to cause widespread decimation of livestock, crop failure, water crisis and personal hardship. Therefore, it is a rainfall-induced shortage of an economic good (Scoones, et al., 1996; Ofori-Sarpong, 1983). There are many types of droughts, though this study focused on two types, namely meteorological and agricultural droughts although the relationship between meteorological drought and the impact on agricultural production is not always clear.

Drought has been a part of our environment since the beginning of recorded history, and humanity's survival may be testimony only to its capacity to endure this climatic phenomenon. It is a recurrent climatic phenomenon whose onset, cessation or recurrence is extremely difficult to predict in Africa due to lack of reliable data. It is unique among spells of weather, it creeps upon us gradually, almost mysteriously, but its consequences are a terrible reality. Indeed, drought is one of the best examples of our helplessness before the broad-scale phenomena of nature (Devereux and Neraa, 1996).

Drought has a long history. The first heroic legend, the epic of Gilgamesh, which dates back from the second millennium Before Christ (B.C.), tells how King Gilgamesh of Uruk in Mesopotamia fought with and defeated drought in the form of a bull from heaven. Written records of drought in China go back at least to 206 B.C. (Kelly and Wright, 1978). According to Yevjevich, et al., (1978), one of the earliest records of efforts to plan for droughts is found in the biblical story of Joseph. The Pharaoh of Egypt gave Joseph the authority to plan and implement perhaps the world's first recorded national drought strategy. One can ask if improvements in

society's planning capability over the past several millenniums have increased our ability to deal with droughts in other than catastrophic terms. Certainly, droughts will continue to be randomly occurring climatic phenomenon. Yet, despite the long history of its occurrence, it has been the subject of few studies even on world scale.

In the period between 1961-1991, 1, 333, 728 persons died from drought world wide (De and Joshi, 1998). The 1970-73, 1975-77, 1983-84 and 1991-92 droughts were described as unusual and worst natural disasters to affect Africa in the 20th Century (Washington and Downing, 1999). Millions of dollars and man-hours have been spent on food relief, drought related services, research projects on drought and famine in Africa. The disastrous consequences of climatic events in Africa during the past three decades are demonstrations of climate's impacts on many aspects of life (Sichingabula, 1998).

In Zambia, the international donor community has provided food and non-food aid towards drought relief. For instance, the 1992 and 1995 droughts were valued at over US\$70 million and US\$40 million respectively. In the 1992/93 season Zambia received almost one million tonnes (970,000 tonnes) of grain (maize, wheat, sorghum, etc) from the international community and in 1992, 4.5 million bags were harvested instead of 12 million bags (Programme Against Malnutrition [PAM], 1993; Banda, et al., 1997).

In the Monze district, farmers' crops, cropping patterns and a range of animals are often adjusted carefully in order to reduce the risk of complete livelihood loss in the face of drought. Consequently, it is important that plans are made for the provision of relief in the event of future droughts and that measures are taken through sustainable rural development policies to reduce the effects of drought. But evidence indicates that society tends to be unwilling to plan for droughts (Zambia Daily Mail, 1994; Sichingabula, 1997).

1.2 Statement of the problem

Drought has affected a substantial part of Zambia, which has brought about a greater awareness of our dependence upon and the need to conserve water. It makes us realise how vulnerable we are to the hazard that occurs not infrequently in Southern Africa. As is always the case, it is the rural poor who suffer most of all, but the

drought has affected those in urban areas as well. Since it is in urban areas where most of the decision makers and planners live, it may have brought home some of the harsh realities of water shortages. Devastating droughts have etched on the history of Southern Zambia. These conditions have a strong impact on the weakest groups bringing additional suffering to their already wretched conditions, even to the extent that they have to dispose off their meagre assets (livestock), including in many instances, mortgaging or selling their land (Scoones, et al., 1996).

Zambia experienced one of the worst droughts in its recorded history during the 1991-92 rainy season. In the 1992-93 and 1995-96 seasons, Zambia received 970,000 tonnes and 81,274 metric tonnes of grain from the international community respectively. In the 1992-93 season, Monze district received the largest amount of grain amounting to 380,700 tonnes which was 39.3% of the total grain received in the whole country. During the 1994-95 season, the district recorded 69% of crop failure with 73,765 people (about 49% of the total population) were affected and requiring relief food amounting to 5,920 metric tonnes (PAM, 1993; 1995).

Monze district is one of the areas that is seriously hit by drought in Southern province resulting in massive crop failures and livestock losses. Farmers in the district attach prime importance to the preservation of their livestock since this is the most expensive item in their investment portfolio and also the hardest part of their enterprise to replace. Drought has personal, emotional impacts, as well as material ones; the anxiety, fear and distress experienced by many people in Monze especially during the 1991-92, 1995-96 and 2002-03 seasons were very real. This study assessed the socio-economic effects of drought and human responses to it among the communities of the study wards. In the recent past, the hazard came at a time when the country was experiencing other serious problems such as the economic crisis and HIV / AIDS epidemic.

1.3 General objective of the study

The general objective of this research was to examine how people of Monze South East, Central and West have been affected by drought and how they have responded to it as communities.

1.4 Specific objectives

Arising from the general objective of this study were the following specific objectives:

- i. To assess the socio-economic effects of drought in the study wards;
- ii. To determine the range of responses or adjustments to drought by social groups in the study wards;
- iii. To assess the role of Non- Governmental Organizations (NGOs) in helping local communities' drought related mitigation strategies in the study wards;
- iv. To assess the impacts of food-for-work (FFW) projects on the community livelihood systems in the study wards;
- v. To determine the characteristics of drought in the study area;
- vi. To determine the occurrence of drought in the study area;

1.5 Hypothesis

There is a significant increase in livestock deaths when rainfall is low.

1.6 Research questions used in this study were:

- i. What means had the local communities developed to combat the effects of drought in the study wards?
- ii. What were the effects of drought on agricultural production in the study wards?
- iii. What were the benefits of the FFW programmes on local communities in the study wards?
- iv. What were the performances of NGOs in related drought mitigation strategies in the study wards?

1.7 Significance of the study.

Natural hazard studies, especially those that focus on how man perceives and responds to the socio-economic and environmental stress, are of central and traditional concern to geographers. Drought is a normal feature of climate and its recurrence is inevitable. The causes of drought and other climatic variations are many, complex and still not fully understood (Muchinda, 1995). When placed in the historical perspective, droughts have not received much attention from African

governments at any level until when severe food and water shortages occur. What most inhibits the planning associated with droughts is their sporadic nature.

Southern Zambia experienced below and above average rainfall in the periods 1886-1925 and 1926-1970, respectively. One is led to wonder just how unusual such a run of dry years is and how severe this rainfall deficit was in relation to other dry years. The decrease after 1970 is somewhat related to the accelerated global warming associated with anthropogenic activities (McGiven, 1985; Sichingabula, 1995). The region suffers more from the impact of drought than any other area in the country. There is fear that if persistent droughts continue, the desertification process would ensue in the country. Despite the long history of its occurrence, drought has been the subject of a few studies in Zambia.

It is therefore in view of the above that this research was carried out so that, depending on the conclusions and recommendations drawn, measures may be taken to mitigate future droughts. It is also hoped that the local community will seriously embark on other possible adaptive responses to this chronic phenomenon because it costs the district lots of money and man-hours meant for serious development programmes. This study will also contribute to knowledge on drought in Zambia by directly addressing the issue of drought in Monze district. It has investigated the characteristics of drought, the socio-economic effects and human responses of reducing vulnerability of the local people to drought. The knowledge obtained would be useful to planning especially in agricultural and water supply sectors.

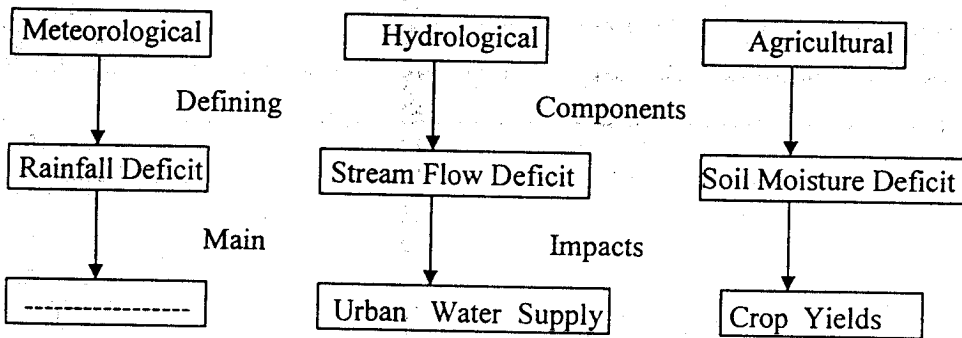
CHAPTER TWO

LITERATURE REVIEW

2.1 Types of Droughts

Since drought is a human concept, it is difficult to give it a universally accepted definition because conditions which might be considered to constitute it vary over time and space. Most studies on drought deal with moisture deficiencies in terms of impacts to human activities, especially those involving agriculture. The definition and perception of it varies with climate. However, the difficulty of definition arises because whether or not lack of water constitutes a drought depends very much on the local conditions and the particular needs for water which prevail (Grainger, 1990).

Most definitions of drought indicate that it should be viewed with regional bias, since water supply is largely a function of climatic regimes, and droughts impacts should be seen as dynamic effects resulting from the interaction between supply and demand for water. In trying to overcome the difficulties in defining drought we may try to examine the main types of droughts. This can be done with reference to Figure 1.



(Adapted from Smith, 1992: 249).

FIGURE 1: Types of droughts.

Meteorological drought: This type of drought occurs when there is a below average natural precipitation in a given period of time (Barry and Chorley, 1987).

Hydrological drought: This type of drought occurs when there is a reduction in stream flow which adversely affects human activities. There is marked reduction in stream flow and groundwater levels or the depletion of water stored in surface reservoirs and lakes for water supply purpose (Smith, 1992; Sickingabula, 1995).

Agricultural drought: This type constitutes the lack of adequate soil moisture to sustain crop growth and production (Smith, 1992; Scoones, et al., 1996).

From a different perspective, Bernard (1970) identified three types of droughts, namely, **Seasonal, contingent and invisible**. Seasonal droughts occur in areas of distinct rainy or dry periods; Contingent droughts occur in areas that have an adequate rainfall, but represent a deviation from normal; and Invisible droughts, are the ones which exist when high temperatures cause high rate of evaporation, even when the amount of precipitation is relatively high.

From the different types of droughts identified, droughts are extended periods of below average rainfall. In each example above, the phenomenon of drought is not defined, rather an environmental or socio-economic response related to its occurrence establishes the criteria for its definition. To have a universal application and a scientific legitimacy, drought needs to be defined in meteorological terms. For the purpose of this study, several definitions of drought were adopted:

Drought is when rainfall amounts and distribution, soil water reserves and evaporation losses combine to cause crop or livestock yields to diminish.

Drought is a rainfall-induced shortage of an economic good.

Drought is a period of dry weather of sufficient duration to cause widespread decimation of livestock, crop failure, water crisis and personal hardships.

Drought is an extended period of below average or normal rainfall creating shortage of water for crops and livestock, shortage of water for utilities, recreation and wildlife.

Drought is loss of agricultural and natural resource-based livelihood and income, food insufficiency in affected areas, loss of productivity and livestock deaths.

2.2 Drought and Famine

Drought, though with no universally accepted definition is an extended period of below average precipitation to cause livestock deaths, crop failures, personal hardships and water crisis (Ofori-Sarpong, 1983). According to Grainger (1990), famine is a man-made disaster which occurs when poor crop yields lead to severe food shortages in a particular area. Famine is caused due to continuous drought for two to three years and if vulnerability of community affected is too much as per income. The market mechanisms and government interventions are sufficient to balance these shortages with supplies from elsewhere. For instance, famine arises from misguided agricultural policies or the inadequacy of transport to ship food from one part of the country to another. Thus, a country can have an overall food surplus yet some people can still starve. The major difference between drought and famine in relation to different drought periods is that drought is the setting stage for famine, but famine does not have to be a consequence of drought.

2.3 Drought Occurrence

Drought has a long history. According to Kelly and Wright (1978), the heroic legend, the epic of Gilgamesh, which dates from the second millennium Before Christ (B.C), tells how King Gilgamesh of Uruk in Mesopotamia fought with and defeated drought in the form of bull from heaven. Written records of drought occurrence in China go back to 206 B.C. In Australia, there is abundant evidence of drought both before and after the first fleet of 1788. In the 1970s and 1980s, drought had been certainly a prominent climatic feature, with major ones in Southern and Eastern Africa, the Sahel region (covering countries like Ethiopia, Mali, Senegal, Niger, Burkina Faso, Sudan and Mauritania), Northern India, North East Brazil, the USA, Australia and even places like island of Borneo (Grainger, 1990). In Kenya, a study of three districts showed that on average local droughts occur every year. Those affecting a few districts occur once every three to five years and national droughts affecting more than one province occur once in every ten years.

“The climate of Zambia between 15,000 year and 1500 year Before Present (B.P.) has been characterized by episodic dry and wet periods evidenced by the analysis of paleosediments obtained from lake Cheshi near Mweru Wantipa” (Sichingabula, 1995: 1). Rainfall records which show that Southern Zambia experienced below and above average rainfall in the period of 1886-1970, were examined. It was observed

that the decrease in rainfall after 1970 were somewhat related to the accelerated global warming associated with anthropogenic activities (Sichingabula, 1995).

Droughts occurred in Zambia between 1921 and 1970 lasting from 1-10 years with an average duration of 5.5 years. The most frequent droughts were the one year droughts which occurred in 52 percent of the time. Three to five years droughts occurred between four and 12 percent of the time while much longer droughts up to 10 years, occurred in less than one percent of the time (Sichingabula, 1995). The probability of drought occurrence is lowest in the wettest north eastern area (34 percent) and in driest south western areas are highest (66 percent) and for most of the country, it was found to be 50 percent (Sichingabula, 1998). Based on historical records (1921-1996), drought covering more than three quarters of the country could be expected at least once in a decade.

“Basing on the Gwembe station with more consistent record of rainfall since 1948, the drought frequency (number of years with rainfall less than the regional average of 750mm) was quite high.....there were 22 seasons with less than 750mm of rainfall. Of these seasons, more than half occurred after 1980. The annual departure from normal season for 1961/62 to 1998/99 indicated rainfall shortfalls as much as -400mm (-53%)” (Mwenda, 2002:42). Muzumara (1990) also observed that drought occurrences were quite frequent in Gwembe central. This was from climatologically stand point where the data on rainfall departures from the normal portrayed that image.

2.4 Effects of Droughts

Though the calculation of loss resulting from drought is an advantage from the general economic stand point, the fact that drought does not occur everywhere at the same time, the local effects are often offset by inter regional flows (e.g. livestock, seed). This offsetting, however, makes accounting for drought at a regional level extremely difficult, since such flows are often hidden, moreover, unaffected regions may benefit financially from their neighbours drought (Smith, 1992).

In North Eastern United States and Canadian prairies, the 1961-1966 year drought caused acute water shortages in municipal supplies and crop failures forced marginal farmers out of business (Burton and Visvader, 1974). The 1983 year drought in the

USA reduced corn yields by 29% compared to the previous years and production fell by 50% (Grainger, 1990). According to Smith (1992), in 1988, the USA experienced one of its costly agricultural droughts due to lack of precipitation and extreme heat in the mid-west. It was reported that corn yields declined 31% below progressive upward trend driven by improved technology. More than one third of the corn crops were destroyed at a loss of at least US \$ 3.7 billion.

In Australia, drought conditions in eastern parts of the country, in 1982, had devastating effects. The economic impact was estimated at two million Australian dollars. Furious bush fire raged, and a large dust storm carried away 200,000 tonnes of the topsoil (Simpson, 1986). The 1970 year drought, in the North Eastern region of Brazil, affected an area with 7,677,000 inhabitants, which was 31.8% of the regional population at the time. Dias (1974) reported that notable effects included the increase in unemployment levels, social disorganization due to increase in anti-social behaviour such as theft, assault, assassination, prostitution, threats of invasion of small cities and store houses by the hungry population.

In 1972, five years of relentless drought had brought catastrophe to millions of people in the sub-Saharan region of West Africa-Sahel. Famine took a grim toll among people, the US health experts calculated between 100, 000 and 250, 000 deaths and the majority were children. There was also a destruction of a way of life for two million pastoral people. Camels, sheep and cattle herds were wiped out, their livelihood gone, the nomads survived famine only to face despair, diseases, and still uncertain food supplies in refugee camps. An estimated 3.5 million herd of cattle, 25% of the total, died in the Sahel in 1972-73 year period alone (Sheets, 1974; Grainger, 1990).

Retrospective interviews in Ethiopia in early 1974 revealed that farmers, tenants and landowners lost cattle through enforced sale. Servants and dependants were evicted and they were amongst the first to gravitate toward urban centers. This disrupted family life that later extended to social and community life. This so called "mass wandering" had serious effects in that travelling to different places exposes people to communicable diseases (Wood, 1974).

In Upper Volta, the 1970-73 and 1975-77 droughts were the greatest in severity and aerial extent. It gave rise to large-scale disruptions of socio-economic activities due to crop failure and lack of water and animal pasture. Ofori-Sarpong (1983), reported that in 1971, Upper Volta had 2.6 million herds of cattle but by 1974, after the drought, the population reduced to 1.6 million; a reduction of 38%. "Beef and veal production dropped from 17, 000 tonnes in 1972 to 8, 000 tonnes in 1974, thus showing a 53% reduction. Crop production also sufferedfor instance the amount of millet fell from 397, 000 tonnes in 1971 to 263, 000 tonnes in 1973, a drop of 36%" (Ofori-Sarpong, 1983:59).

In Ghana, following three successive years of drought, bush fires swept across the entire country in 1983 causing massive destruction of farms growing food crops. It was estimated that about 10, 000 hectares of food crop farms were destroyed. Several thousand hectares of cocoa crops were also destroyed in forest regions. Also reported were acute water shortages, for instance, the lowest water level ever recorded in Akasombo dam occurred in 1983, which resulted in hydroelectric power rationing across the country (Ofori-Sarpong, 1986).

Studies in Southern Africa revealed that the drought problem in Botswana is a fact of life. According to Dintwa (1980), in a country where there are more cattle than people, overgrazing at water points during drought is crucial. Land is lost every year to the Kalahari desert due to drought. In Zimbabwe, the 1982-84 and 1991-92 year periods droughts were the most severe in recorded history. The effects included increased malnutrition, disease and infant mortality as well as the long term loss of agricultural capital for large segments of the black small holder sector (Weiner and Murphy, 1992; Scoones, 1996).

"Schools reported cancelling physical education classes due to the inability of pupils to participate, as malnutrition and related diseases reduced children's energy levels. Teachers reported increasing absenteeism while there was considerable deterioration in pupils concentration" (Weiner and Murphy, 1992: 17). The severe social impacts of the droughts were malnutrition, disease, mass hunger and a severe water crisis. The rivers and wells ran dry, all crops failed, people's food stores were consumed and cattle perished in large numbers (Scoones, et al., 1996).

According to the Ministry of Agriculture Water and Development [MAWD] (1984), the 1982-84 year period, drought reduced livestock (especially cattle) numbers because of lack of food; most farmers were unable to repay their creditors and hence the Agricultural Finance Company (AFC) had experienced low recovery rates in

Western, Eastern, Southern and Lusaka provinces. The African Academy of Sciences [AAS] (1991), revealed that the 1983-85 year period drought hit 30 countries in Western, Eastern and Southern Africa. About 30 million people were affected; of which 10 million were forced to abandon their homes in search of food. In Mozambique, Angola, Sudan, Ethiopia and Zambia people depended on food aid during this period. During the 1981- 84 year period, the effects of drought were greatest in the rural populations in some areas of six provinces (Southern, Western, Eastern, Northern, Lusaka and Central). In Gwembe and Luangwa valleys, where the effects were severest most people had no food of their own and had to rely heavily on relief food for survival. On the national level, the losses incurred from this drought were enormous. For example, in 1982-83 agricultural season alone, losses from major crops were estimated at a value of US\$ 21.7 million (GRZ, 1984).

The 1992 year drought in Zambia affected more than three million people. Tiffen and Mulele (1994), reported that in Southern province cattle numbers were reduced greatly due to corridor disease and partly because farmers were forced to sell livestock in order to raise money for food. Chifuwe (1994), reports that maize production declined as 40% of the farmers in Chikuni area harvested between one and five 90kg bags of maize per household (the staple food crop) and many people especially women and children covered 1-5km distance in search of water. Bush fires and unregulated wood harvesting in Chikuni had been identified as the main causes of ground cover annihilation.

“The droughts of 1924, 1933, 1946, 1949, and 1965 impacted more than 80% of the 46 districts. The 1949 event was most widespread and impacted the greatest area (92%). The year 1987 and 1992 each impacted 90% and 88% of the country’s area respectively” (Sichingabula, 1998:130). The effects of recent droughts especially in the 1991-1997 year period were disastrous. For instance, the 1992 year drought severely affected more than 50% of Zambia in terms of water supply operations. In rural areas, many wells dried up forcing people to abandon their homes or walk long distances to fetch water. There was decline in hydroelectric power generation,

widespread crop failures, loss of livestock and the disruption of urban lifestyles due to low pressure and erratic supply of water, hence water rationing. This too had reduced foreign exchange earnings from water based recreation activities and tourism (Sichingabula, 1998). The effects of the 1990s droughts that affected nearly all aspects of Zambian society acted as a signal to more disastrous drought events likely to occur in future.

According to Mwenda (2002), the general effects of drought in Gwembe valley included severe hunger and starvation as crops withered before maturing and livestock died due to lack of water. The wealth of people reduced through the sale of personal property. Additionally, sources of water dried up completely or had yields decreased, vegetation was affected causing a number of both domestic and wild animals to reduce drastically due to lack of proper pasture and water. Water levels in lakes (dams) were very low, animals got stuck in mud. People had to walk long distances to fetch water and queued for long hours. Prices of water went up due to high maintenance costs of pumps.

Mwenda (2002), pointed out that increased livestock deaths led to income losses, particularly among the poor and women whose income sources depended on water such as the sale of beer, vegetables and brick moulding. The drought reduced food poorer villagers obtained from working on the land of richer farmers whose harvests also failed and it cut the amount of food received as gifts. There were increased cases of water-related diseases such as dysentery, diarrhoea, bilhazia and cholera due to contaminated water shared by animals and people. Learning environments schools were not conducive because schools turned out to be food distribution centres and teachers were involved in relief food distribution. Attendance and enrolment in schools were erratic due to increased need for family labour. Mothers and girls spent most of the time fetching for water and gathering wild fruits.

The effects of droughts in Gwembe valley were manifested in crop failure and depleted food stocks. Water scarcity led to many diseases and livestock deaths. Human reactions like failure to act quickly in the wake of drought signs, cultivation of inappropriate crops and in some instances, sheer laziness by people who depended on receiving free food-aid were among the factors to hardships local people faced (Muzumara, 1990; Mwenda, 2002).

2.5 Human responses/adjustments to droughts

Most environmental hazards that pose a recognisable threat to human populations produce some responses designed to reduce the level of risk. At the most sophisticated level, the actions taken reflect an attempt to manage the full range of the hazards that affect a particular area (Smith, 1992). Societies develop more preventive measures to cope with drought depending on their level of development. Generally, the more a society develops its water system, the better it is able to mitigate the danger of drought.

In the USA, Russia and Canada, measures adopted to mitigate effects of agricultural droughts were contour ploughing, strip farming, micro terracing of slopes, purposeful selection of drought resistant crops and livestock, stubble mulching and summer ploughing (Burton and Visvader, 1974). In Oaxaca, Mexico, long term cultivators adjusted by controlling and distributing floodwater through the construction of dams and earth canals (Kirkby, 1974).

Dupree and Rodder (1974), reported that in Yelwa, Yauri, Emirate, North West State and Nigeria, adjustments to drought required the turning to God and pray to Allah or traditional gods for help; getting help from relatives; selling or liquidating more important belongings; enhance income by selling handicrafts and firewood. In Tanzania, Sukumaland area, people appealed to rainmakers; used thorough weeding; planted on *mbunga* (soil with high moisture capacity); sent cattle to other areas to graze; and farmers moved in search of food to roadside camps (Ranking, 1974).

In East and North Africa, "staggered planting" is used as a coping strategy, because first rains may fail and replanting may be done to take advantage of the expected long rains. Reduction in caloric intake; seek alternative employment; storing food; doing nothing; saving money or investing in cattle were practiced mainly by villagers in Tanzania, Kenya, Malawi and Zambia as a measure to cope with drought (Berry, et al., 1971). In Zimbabwe, human adjustments to droughts of 1982-83, 1986 and 1991-92 year periods were major food relief efforts by government and NGOs; large-scale cattle migration; FFW programmes and supplementary feeding (Scoones, et al., 1996).

In areas of persistent and recurrent drought hazards evolved subtle and varied modes of accommodation to enable man to survive. In Eastern and Central Africa, people have artificial and efficacious adjustments and the ceremonial appeals to the supernatural are commonly added. Those widely practiced modes may play an important role in helping men to cope with the great uncertainties of semi-tropical agriculture. The failures of rains are attributed to people for having discarded their traditional beliefs, hence the spirits are not pleased (Wood, 1974).

MAWD (1984) reported that programmes to alleviate the drought situation in Southern and Western provinces of Zambia were the construction of 14 earth dams and repairs of the existing ones which was estimated at a cost of US \$580,000; bore holes and wells drilled at a cost of US \$11.2 million. There was also the Zambia's Operation Food Programme [ZOFFP] where the construction of proper and reliable food storage facilities along the line of rail was carried out. After the 1986-87 year drought, the Goncins Germany Company introduced irrigation schemes in conjunction with the Food and Agriculture Organisation (FAO) and World Food Programme (WFP) in Gwembe and drilling of 700 bore holes and wells for irrigation canals in Western province by the Royal Norwegian Development Agency [NORAD] (MAWD, 1987).

Government's effort to provide communities with adequate and safe water cannot be fully achieved due to lack of financial resources. However, after the 1992 year drought, it was gratifying to note that these efforts had always been supplemented by external agencies such as donors and NGOs. On realising the need for sustainability of the facilities, the agencies approached the problem by involving the community in basic operations and maintenance skills. The combined activities of support agencies yielded the following results from June 1992 to February 1994 (Table 1).

TABLE 1: Activities carried out by support agencies –June 1992 to February 1994.

PROVINCE	AGENCES	WORK DONE					
		WELLS		BOREHOLES		DAMS	
		NEW	REHAB	NEW	REHAB	NEW	REHAB
Southern	Africare, Unicef, Care, Family Farm, Gossina Mission		135	10	264	8	23
Luapula	Water Trust, Unicef, World Vision International	37					8
Copperbelt	Eec	4					
Lusaka	Unicef	10	12		2		
Eastern	Lwf, Lirdf, Unicef	116	425	79			
North western	Snv, Irdp		12				
Western	Norad, Unicef	44	1	32			
Northern	Irish	32					
Central	German government	Various systems of rural water supply i.e. wells /bore holes /dams					

Source: Times of Zambia, March 22, 1994, 5.

People living in high drought prone areas employed a variety of purposive adjustments for ameliorating its effects. The adjustments to droughts among the Tongas of Gwembe valley were simple in character and were deeply rooted in their agricultural and social systems. They included planting of drought tolerant crops (millet and sorghum), rain-making and the selling of livestock. The adjustments were of an individual centred nature and were widely viewed as being very useful in mitigating drought effects. They involved very little capital and were deeply rooted in the traditional farming and social systems of the valley Tongas. These individual efforts were supplemented by relief food from the government and voluntary organizations (Muzumara, 1990).

The government of Zambia reacted swiftly to the 1991-92 year drought by importing grain and requesting for food aid. Food distribution in rural areas was organized through non-governmental organisations and many people received relief food through FFW or free distribution. During food for work projects, a number of activities were carried out in communities, for instance, road and dam construction

(Chifuwe, 1994; Tiffen and Mulele, 1994). The government in response to the 1992 year drought set up at national level, a drought relief task force with Ministry of Agriculture Food and Fisheries (MAFF) which dealt with various aspects of food relief programme (Banda, et al., 1997).

Mwenda (2002) reported that gardening was practiced throughout in the Gwembe valley with more concentration in valley-floor and so was fishing. Running of small businesses like selling of fowls and small stocks like goats, pigs and cattle which were sold to urban centres were largely practiced by local people. Others collected firewood, wild fruits and made handcrafts (fishing nets, hoes, spears) which they sold.

CHAPTER THREE

DESCRIPTION OF STUDY AREA

3.1 Location

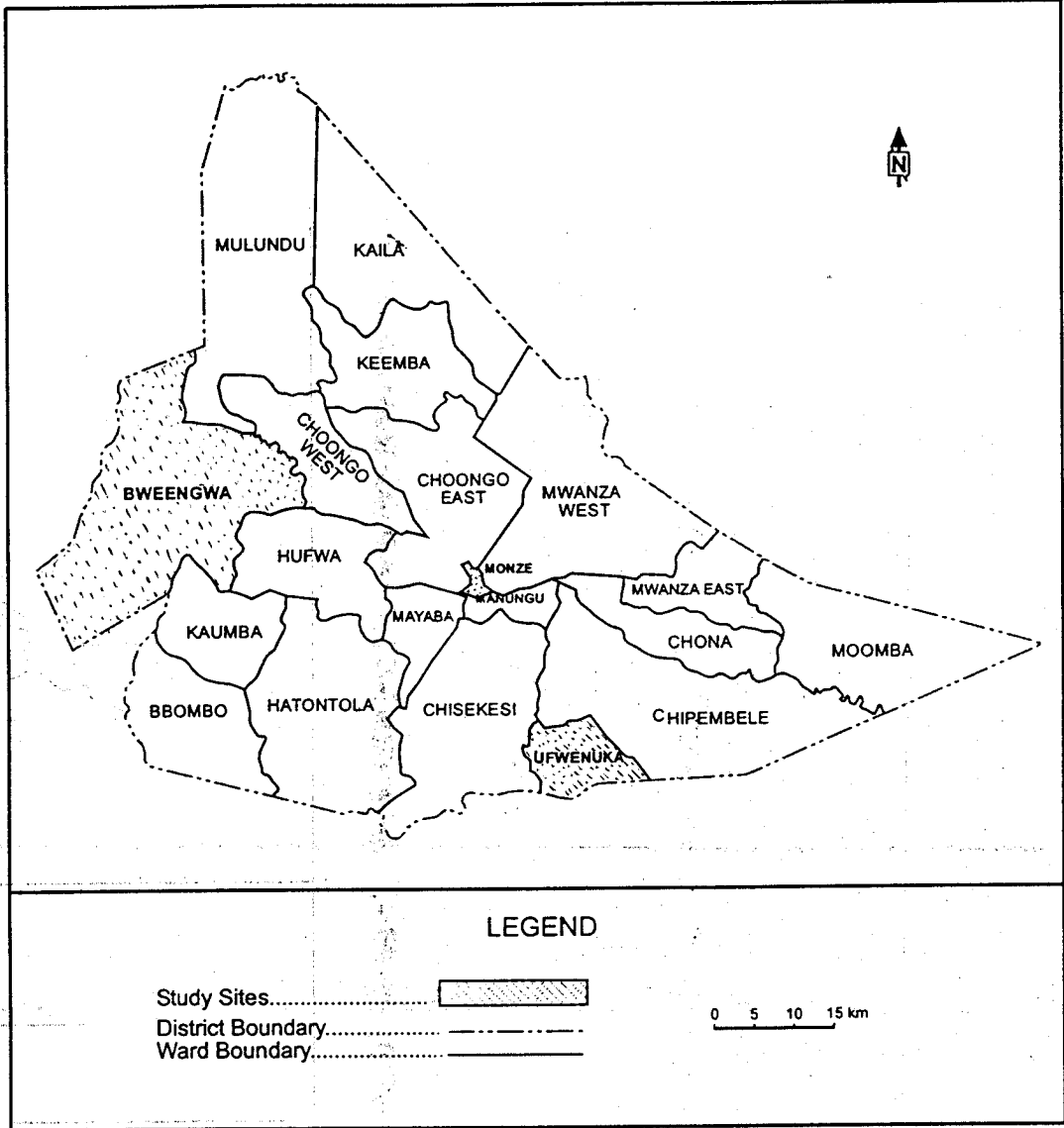
Monze district is located on the northern side of Southern province. The district lies approximately between latitudes 15° 45' South to 16° 30' South and longitude 27° 00' East and 28° 00' East on an average elevation of 1128m. The district is well served by the line of rail and the Great North Road as a means of communication. Figure 2 shows some detail of the location and description of Monze district.

3.2 Study wards

As indicated earlier the research focused on three contrasting study wards – Ufwenuka, Monze and Bweengwa in Monze district. Monze is broadly representative of conditions found in drier parts of southern Zambia, especially Southern province. The study wards are a representative of the range of ecological conditions found within Monze. Each ward has a variety of topographical setting, vegetation associations and soil types; all have sandy soil areas (typically associated with miombo woodlands) and some clay soil areas (typically mopane and acacia woodlands). Figure 3 shows the location of study wards in the district.

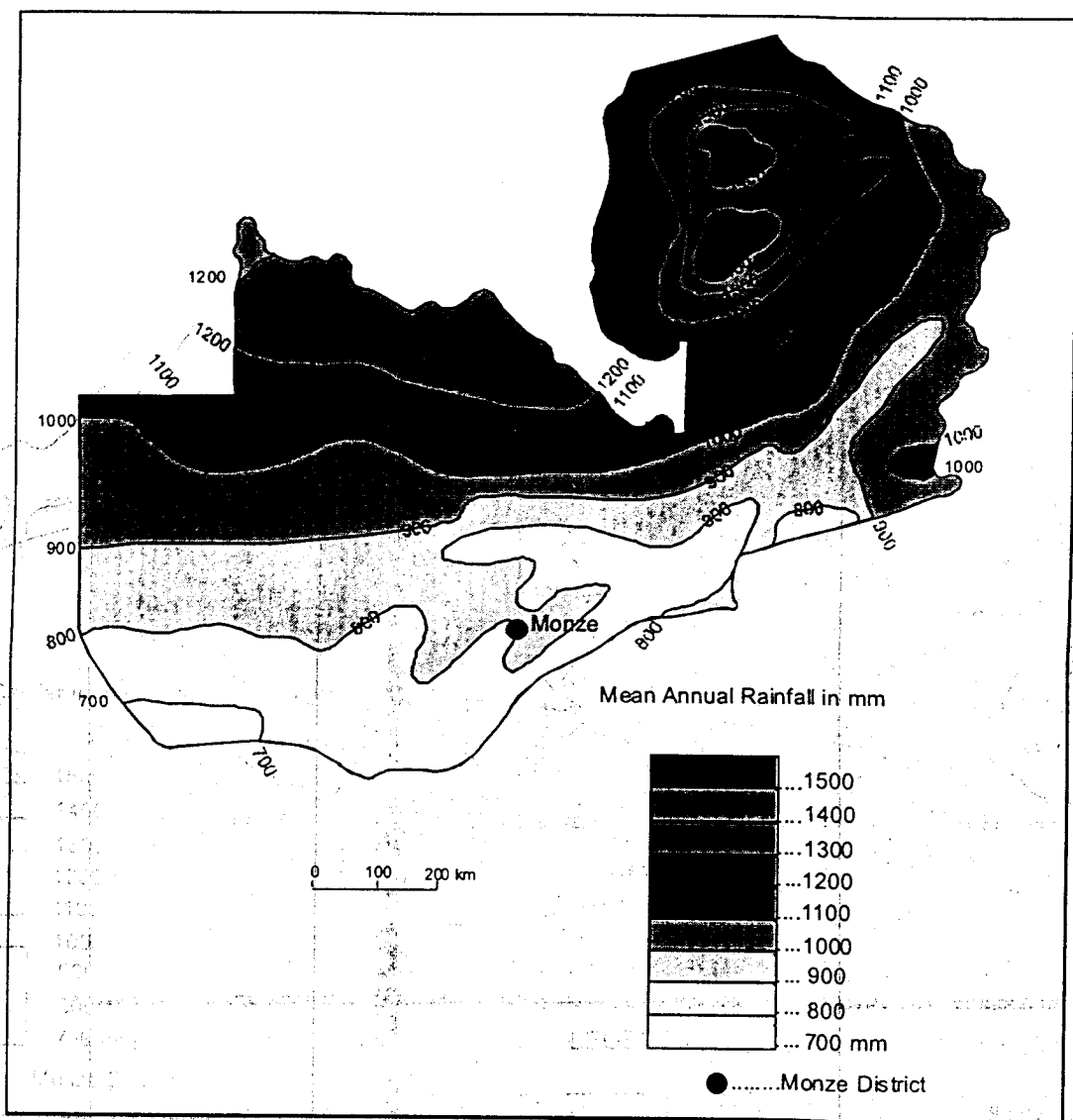
3.3 Climate

The area has a typical subtropical climate with the distinct seasons occurring in succession, hot dry, hot wet and cold dry season. Monze has a distinct rainy season lasting from November to April in normal years. The mean annual rainfall decreases from north to south in Zambia as shown in Figure 4. In the study area rainfall varies between 750mm and 900mm. The district experiences bright sunshine during most of the year with highest mean temperatures in October and lowest in July, 25.7° C and 17.5° C, respectively (Archer, 1971). The rainfall in Monze is more marginal and erratic in both amount and distribution. The severest drought was experienced in the 1991/92 season, which recorded 207.95mm of rainfall, less than the annual mean of 850mm. The length of the growing season is short posing a challenge to agricultural production (Chifuwe, 1994).



SOURCE: CSO Geographic Information Unit

Figure 3: Location of study wards in Monze District



SOURCE: AIIAs sheet 13, (1990)

FIGURE 4 Zambia Mean Annual Rainfall (mm)

3.4 Soils

The productivity of resources in savanna environments is highly dependent on the trade-off between available soil moisture and fertility determined by a combination of rainfall patterns, soil properties and landscape forms (Scoones, et al., 1996). Soils in Monze are red or red-brown clays and heavy sand clays of a fersialitic type. They have a moderate pH 5-7. The solum thickness varies from 50cm to 300cm (Mackel,

1971). Fersialistic soils are suitable for the cultivation of a wide range of climatically adapted crops. It is therefore not surprising that the farmers in Monze used to contribute a lot to maize production in the province. In this respect the plateau Tongas are particularly well favoured compared to people in other African Savanna areas (Anthony and Uchendu, 1970).

3.5 Vegetation

The study area lies in the woodland savanna. The main vegetation is *Munga* woodland-*Brachystegia Isoberlinia*. It is characterized by "*Colophospermum Opine*, *Acacia Tortilis*, *Terminalia* and *Combretum* species among tall, coarse and luxuriant grass. Typical species include *Brachiaria*, *Echinochla*, *Evagrotis* and *hyparrhenia*" (Huckabay, 1975:23). However, the vegetation is a secondary one, the natural vegetation is disturbed by periodic fires, cultivation and grazing.

3.6 Geology and drainage

The rocks of Mazabuka-Monze district appear to form a steeply dipping conformable sequence. The lower part is mainly pelitics, granitised near the base, and with thin limestone higher up. This is overlaid by prominent feldspathic horizon and quartz-moscovite schist sequence. The upper part of the sequence is a largely calcareous and dolomitic hornfels (Newton, 1960). The streams are young vigorous, having an average gradient of 1500 centimetres per 1.6 kilometres. The major streams flowing along the strike of foliation or cutting across in traverse gorges which tend to follow prevailing joint directions. The rivers show a pattern partly adjusted to the structure in which the main elements are foliation of rocks and oblique series of pegmatite dykes (Newton, 1960). The major rivers are Magoye, Bweengwa, Kaloba and Kasungula with many tributaries which are seasonal streams (with no water during drought periods) (Figure 2).

The above description of the geological, geomorphological and lithological structure of the district, agricultural activities are mainly along the rivers and dambos where there is high moisture storage capacity. In study wards, the construction of dams should be vital since there is no other method of supplying water for livestock and domestic supplies which is likely to prove satisfactory.

3.7 Socio-economic conditions of the study area

The main occupation of the population in the study area is farming. Farming and grazing lands can be found in a diversity of environments ranging from plateaux in the east and the central part of Monze to open plains in the west (Bweengwa area). Farmers practice both crop and livestock farming on a small scale with very few on commercial basis. Agricultural production is oriented towards local needs and only limited amounts of farmers products are sold on the market. Different varieties of maize which are selected with preference to soil conditions, personal taste and the planned use of the harvest are grown. In addition, varieties of beans, cowpeas, groundnuts, sweet potatoes, cucurbits, sorghum and millet are grown as food crops. The cultivation of vegetables is common in the dry season and common ones are cabbage, rape, tomatoes, which are both cash and food crops in the study area.

Traditionally, people in the study area are associated with cattle rearing, mainly for draught power, milk, for slaughter during weddings, funerals, and initiation ceremonies, for bride price (*lobola*), manure production and for prestige. There are few commercial farmers who are specialized in arable and dairy farming. Other animals kept include goats, pigs, donkeys and sheep. There is poultry farming near Monze township because of the increase in the number of restaurants though most households keep village chickens (Chifuwe, 1994).

CHAPTER FOUR

METHODOLOGY

4.1 Data sources

Various primary and secondary data were collected for this research. These included unpublished rainfall and temperature figures from monitoring stations in study wards and the Zambia Meteorological Department (ZMD) in Lusaka. Livestock sales and mortality levels were obtained from the Ministry of Agriculture and Co-operatives (MACO). These include the Department of Research and Specialist Services and Monze district annual reports. Household survey data aimed at investigating particular issues in more depth were collected from respondents of selected wards with the help of open-ended questionnaires (Appendix A-1). Data were collected at sample wards using the purposive sampling method through a focal group interview with representatives from all walks of life in study wards. The approach was intended to facilitate participatory community contribution to the perception, effects and response to drought. Another questionnaire was used to collect information from local authorities administering relief food programmes in the study wards (Appendix A-2).

Rapid Rural Appraisal (RRA) exercises and Focus Group Discussions (FGDs) were carried out to investigate key themes which were identified. These included: the effects of drought, coping strategies and the impacts of the FFW projects on community livelihood systems (Appendix A-3). Additional data, especially secondary were obtained using desk research from libraries, Central Statistics Office (CSO), FAO, Programme Against Malnutrition (PAM), WFP, NGOs and Catholic Church Monze Diocese.

4.2 Sampling procedure

The total population of Monze district was 163,578 with 26,398 households located in three constituencies and twenty wards (CSO, 2003). The primary sampling unit was an individual household. A household being a group of people in a dwelling unit. The total target sample was 44 households. Since the numbers of households were large, the sampling techniques used were multi-stage and cluster random. The

proportions between sample wards were given by: $F = n/N$ where F is the proportion between sample wards, n is sample size, and N is number of households in study wards (Bless and Achola, 1990). The total number of households was 4,903; Ufwenuka (1,202), Monze (2,043), and Bweengwa (1,658), hence the number of respondents in each ward was 11, 18 and 15 respectively. Therefore $F = 44/4903$ which yielded 0.009 and this was multiplied by the number of households in each ward in order to get the number of households to be interviewed in each ward.

4.3 Selection of study wards

The primary sources of data for this research were field surveys. The surveys were conducted in three wards of Monze district, namely, Ufwenuka, Monze and Bweengwa. The study wards were selected on the basis of the researcher's familiarity with the wards and the differential intensity of drought. The assumption was that the effects of the drought would have strong influence on the responses of communities living in different wards. Bweengwa has a population of 13,943 with most of the people engaged in pastoral farming. Monze has 11,823 people mainly urban in character. Ufwenuka has 7,336 people with most of them engaged in arable farming (CSO, 2003).

4.4 Analytical methods

Both qualitative and quantitative analyses of data were employed. A statistical analysis was performed in order to infer some properties of the population from sample results. The Statistical Package for Social Sciences [SPSS] (Howitt, 1997) was used to show trends and variations in livestock sales and mortalities and rainfall series discussed below.

Time series; the existing data set from the district, rainfall, livestock sales and mortalities were analysed to explore long term mean at Monze trends over time and five- year moving averages;

Correlation; bivariate and partial correlation at 0.01 and 0.05 levels of significance were used. This was to show the degree of relationships between variables (rainfall, livestock sales and cattle mortalities); bivariate was to assess the degree of relationship between annual rainfall and cattle deaths. Partial correlation was to assess the degree of association between annual rainfall and cattle deaths while cattle sales was controlled;

Drought index; since drought definition hinges on the deficit of annual rainfall below the long-term mean, normalized deviations were obtained by dividing the standard deviations into the difference between annual rainfall and long-term mean series for each ward.

Simple **Drought Index (DI)** (Parry, et al., 1988), calculated as:

$$DI = \frac{P-X}{S} \quad \text{where } P = \text{annual precipitation; } S = \text{standard deviation; } X = \text{mean}$$

The assessment of drought effects on agricultural production and the aspect of human responses were analysed qualitatively.

4.5 Run duration

Drought was defined as an extended period of annual rainfall below long-term mean. The standardized departures from the mean were obtained by dividing the standard deviations into the difference between annual rainfall and long-term mean series (Parry, et al., 1988). The parameter determined was run duration which is the number of years of consecutive drought. It is time in years between successive failures from normal rainfall (Sichingabula, 1998).

4.6 Drought severity index

Another run parameter determined using the simple drought index was drought severity. Drought severity index is the run total of departures. This is the maximum cumulative departure of annual rainfall from long-term mean. The run totals indicate drought severity (Sichingabula, (1998).

4.7 Limitations of the study

This study should have covered other wards of Monze district which were severely affected by droughts, particularly Chona, Moomba, Mwanza East and West, Chisekesi and Bbombo. Due to limitations of time, transport and financial resources, the sample wards were reduced. Since the surveys were conducted after the crisis was over, respondents could not recall very accurately on the effects and responses to droughts in the period under study. Some NGOs and government departments refused to give certain very vital information which they classified as grey literature. For instance the Ministry of Agriculture and Cooperatives (MACO) had no figures for crops focus,

annual production and marketing for the district. Lastly, data for livestock sales and mortality from 1970-1979 were not available because at that time Monze district fell under Mazabuka district.

CHAPTER FIVE

ANALYSIS AND RESULTS

5.1 Characteristics of respondents in study wards

Statistical analysis of the characteristics of households revealed that 65.9% of the respondents were males with females being 34.1%. The marital status was reported to have been 63.6% married, 29.5% widowed, 4.5% single and 2.3 % divorced as illustrated in Figure 5. For those who were married, the results indicates that 57.1% were in monogamous type of marriage while the rest 42.9% were reported to have been polygamists.

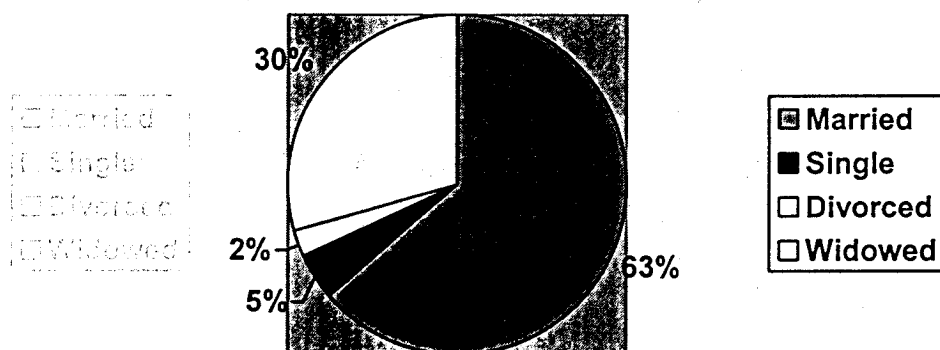


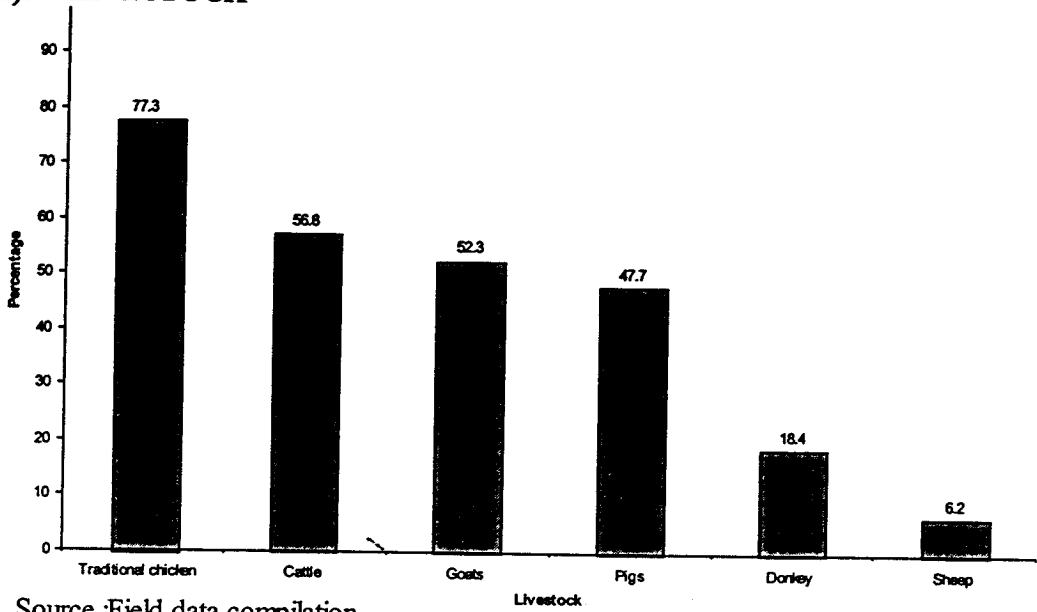
Figure 5 Pie chart showing household marital status

Frequency analysis on literacy levels of households in study wards indicated that 36.4% attained primary, 50% secondary, another 36.4% tertiary and 4.5% non-formal education. Frequency analysis of households revealed that the major sources of income were farming, trading and paid employment and piece work which accounted for 68.2%, 38.6% and 34.4 % respectively

5.2 Agriculture in study wards

In the study wards, 42 households reported being engaged in agricultural activities. This number accounted for 95.5% while two which accounted for 4.5% were engaged in other activities. About 96% of households were engaged in farming by keeping livestock and growing of crops as shown in Figures 6 (a) and (b).

(a): LIVESTOCK



(b): CROPS

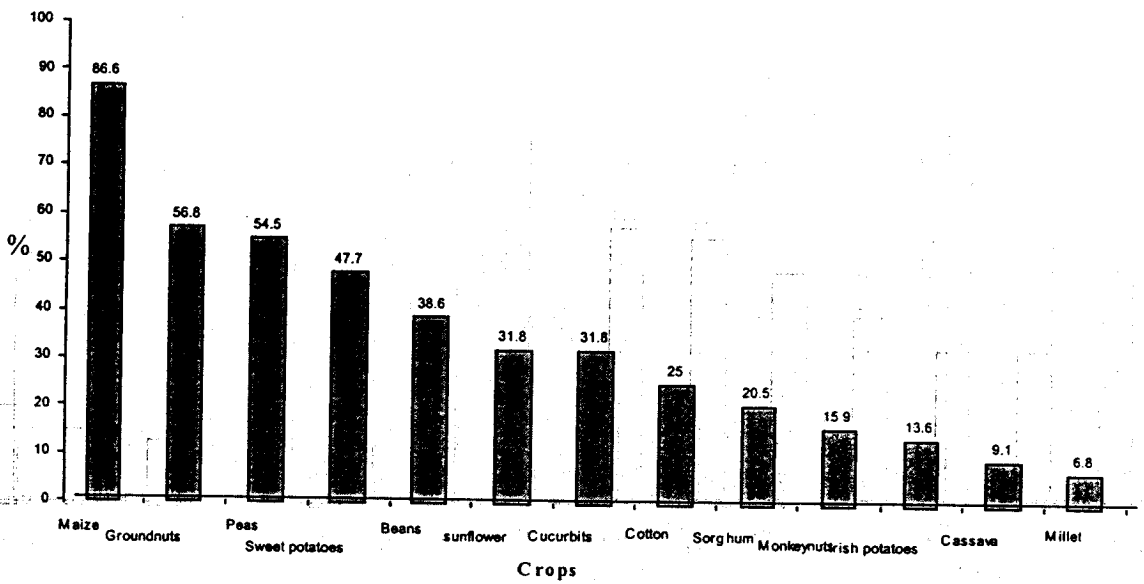


FIGURE 6: Livestock kept and crops grown by households in study wards.

The frequency analysis on households engaged in agricultural activities brought out clearly the type of farmers in the study wards. Most crops grown in terms of frequency of occurrence were food crops (maize, groundnuts, peas, sweet potatoes, beans). Livestock production indicated that the keeping of traditional village chicken was highest followed by cattle, goats, pigs, donkeys and the least being sheep rearing. This entails that most of the farmers form small-scale peasant communities, which mainly depend on rain-fed type of agriculture.

5.3 Drought a regular occurrence in Monze

In the analysis of drought occurrence in the study wards, drought was defined as an extended period of annual rainfall below the long-term mean. The normalized deviations were obtained by dividing the standard deviations into the difference between annual rainfall and long-term mean series for each ward (normalized with a mean of zero and standard deviation of one). Drought parameter determined was drought severity which is the run total of the departures from normal (Sichingabula, 1998). The analysis of precipitation data indicated that Monze has a history of recurring drought. In the 33 years between 1970 – 2003 period, drought occurrence was analyzed using a simple drought index (DI) (Parry, et al 1988), where DI is calculated as

$$DI = \frac{P - X}{S}$$

where P = Annual precipitation

X = Mean

S = Standard deviation

The results are given in Tables 2 and 3.

TABLE 2: Drought indices for study wards from 1970 to 2003.

Year	Ufwenuka (Chikuni)	Monze (ZCA)	Bweengwa (Magoye)
	DI	DI	DI
1970	-0.2	-0.5	=
1971	-0.5	0.1	=
1972	0.7	0.2	=
1973	-0.8	-0.0	=
1974	2.1	1.7	=
1975	0.3	-0.0	=
1976	0.2	0.4	=
1977	-0.4	-0.3	=
1978	1.4	2.1	3.1
1979	0.1	-0.3	0.9
1980	1.4	0.1	-0.7
1981	0.9	0.4	0.4
1982	-0.9	-1.1	-0.1
1983	-0.6	0.2	0.0
1984	-1.7	-0.9	-1.0
1985	-0.4	0.3	0.8
1986	1.1	2.0	0.3
1987	0.2	-0.7	-0.9
1988	-0.6	-0.0	-0.5
1989	1.1	1.7	1.0
1990	-0.0	-0.6	0.9
1991	-0.8	-2.8	-0.5
1992	-1.0	-1.3	-0.4
1993	0.4	-1.0	-0.5
1994	-1.1	-1.0	-1.1
1995	-1.7	-0.8	-1.3
1996	-0.4	-0.4	0.3
1997	2.2	0.9	1.3
1998	-1.2	0.0	-0.1
1999	0.2	1.2	0.4
2000	0.2	-0.0	0.9
2001	1.4	1.4	-1.0
2002	-1.1	-0.8	-1.8
2003	-0.3	-0.1	-0.5
Standard Deviation	209.7	189.8	137.9
Mean Rainfall	791.9mm	744.6mm	699.0mm

Drought Index is the normalised maximum departure of annual rainfall from long-term mean.

= means missing data

Key: Light drought DI =< -0.2; Moderate drought DI =< -0.5; Severe drought DI =< -0.8; and Very severe drought DI = < -1.3. (Scoones, et al, 1996).

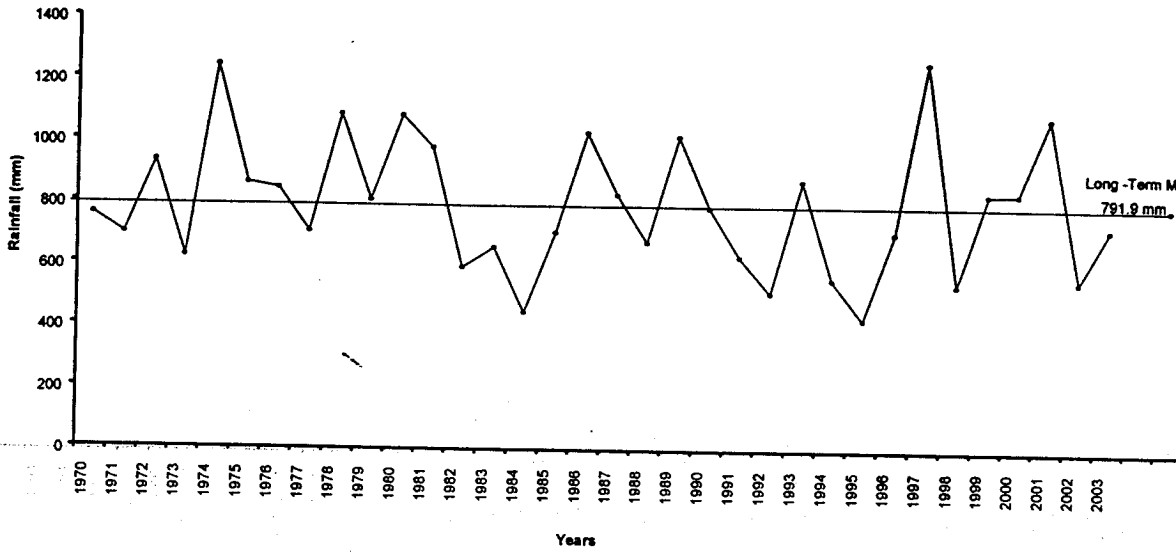
TABLE 3 Droughts with greatest effects in study wards

UFwenuka (Chikuni) 1970 – 2003			Monze (ZCA) 1970 - 2003			Bweengwa (Magoye) 1978 - 2003		
Drought Period	Run Duration (years)	Severity (DI)	Drought Period	Run Duration (years)	Severity (DI)	Drought Period	Run Duration (Years)	Severity (DI)
1970 - 71	2	-0.7	1970	1	-0.5			
1973	1	-0.8	1973	1	-0.0			
1977	1	-0.4	1975	1	-0.0			
1982 – 85	4	-3.6	1977	1	-0.3	1980	1	-0.7
1988	1	-0.6	1979	1	-0.3	1982	1	-0.1
1990 – 92	3	-1.8	1982	1	-1.1	1984	1	-1.0
1994 – 96	3	-3.2	1984	1	-0.9	1987 – 1988	2	-1.4
1998	1	-1.2	1987-88	2	-0.7	1991 – 1995	6	-3.8
2002 - 03	2	-1.4	1990 – 96	7	-7.9	1998	1	-0.1
			2000	1	-0.0	2001 – 2003	3	-3.3
			2002 - 03	2	-0.9			

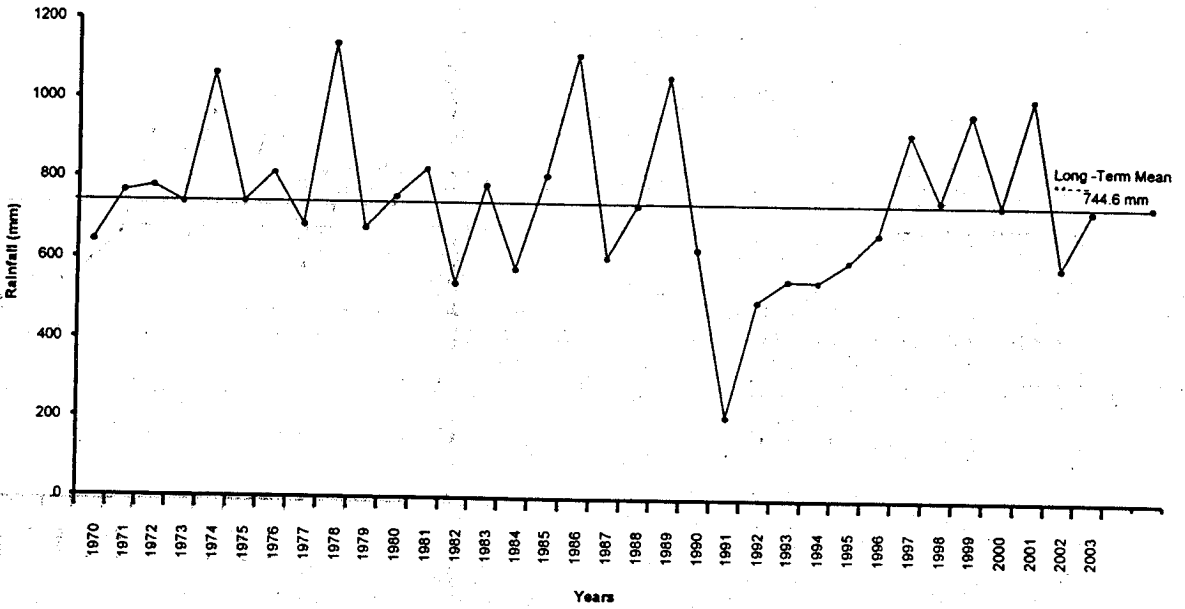
Drought index severity is the normalized maximum cumulative departure of annual rainfall from long-term mean.

Figures 7 (a),(b) and(c) show the trends in annual rainfall for the study wards based on observations at monitoring stations in Monze (1970-2003), and rainfall departure from the long-term mean.

a. Ufwenuka (Chikuni)



b: Monze (ZCA)



c: Bweengwa (Magoye)

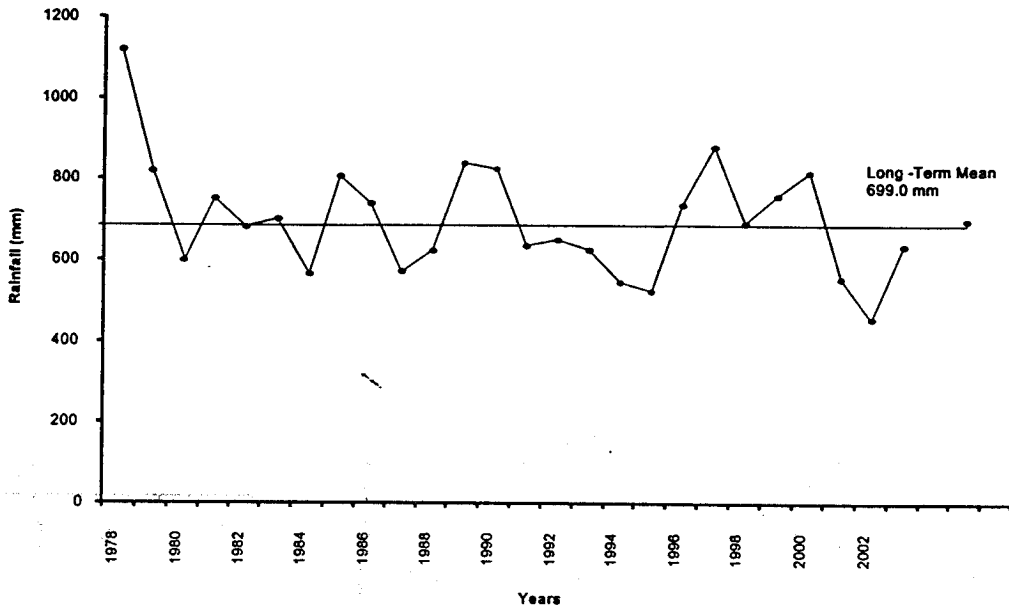


FIGURE 7: Trends in annual rainfall (mm) for study wards from 1970-2003.

5.4 A brief history of drought in Monze

A brief historical sketch of previous drought periods provides an insight into the varied drought coping responses employed over time. This was drawn from Monze district annual reports, local historical interviews and Focus Group Discussions. The schematic chronology is drawn up in Table 3, showing how effects and responses have changed over time.

TABLE 4: Chronology of droughts in Monze District.

period	Effects	Responses
1970s	<ul style="list-style-type: none"> ⇒ Some cattle mortality ⇒ Reduction in crop yields 	<ul style="list-style-type: none"> ⇒ Cattle movement ⇒ Use of wild resources ⇒ Traders sell grain for livestock
1980s	<ul style="list-style-type: none"> ⇒ Major crop failure and livestock mortality ⇒ Increase in cattle sales ⇒ Some livestock mortality ⇒ Sharp increase in sales (especially cattle and traditional chicken) 	<ul style="list-style-type: none"> ⇒ Ceremonial appeals to traditional gods (Malende-Shrines) ⇒ Major food relief effort by government and NGOs ⇒ Use of wild resources ⇒ Migration of livestock (especially cattle) to Central province ⇒ Importation of yellow maize ⇒ Sale of livestock ⇒ Livestock-for-grain exchanges and sale for slaughter to major towns in Lusaka and Copperbelt
1990s	<ul style="list-style-type: none"> ⇒ Total crop failure ⇒ Major cattle mortality ⇒ Surface reservoirs completely dried ⇒ Water rationing and power cut ⇒ Deforestation (especially Ufwenuka Ward) ⇒ Anti-social behaviour (prostitution, theft, witchcraft) ⇒ Decline in pupils' school attendance and cases of malnutrition among children 	<ul style="list-style-type: none"> ⇒ Use of wild resources ⇒ Relief food programme by NGOs, Donors and Government - i.e. FFW programmes) ⇒ Supplementary feeding ⇒ Livestock sales and exchange-for-grain ⇒ Trading (make-shift stalls)
2000s	<ul style="list-style-type: none"> ⇒ Crop failure and some livestock mortality 	<ul style="list-style-type: none"> ⇒ FFW ⇒ FFA ⇒ Trading ⇒ Cattle restocking ⇒ Conservation farming ⇒ Relief food programme

5.5 The socio-economic effects of drought

The socio-economic costs of drought are high. The loss of livestock between 1980 and 2003 is a huge burden to be carried by an already weak rural economy. In the study wards, the value of cattle can be calculated according to their functions. Cattle provide a variety of functions, ranging from draught for ploughing and transport, to milk and manure production, to bride price (*Lobola*), to capital growth or sale. The analyses of time series on the existing data were obtained from the Monze district annual reports. Livestock sales and cattle mortalities were analyzed to assess trends in the long-term means and five- year moving averages. The results are shown in Figures 8,9,10 and 11 and Table 4.

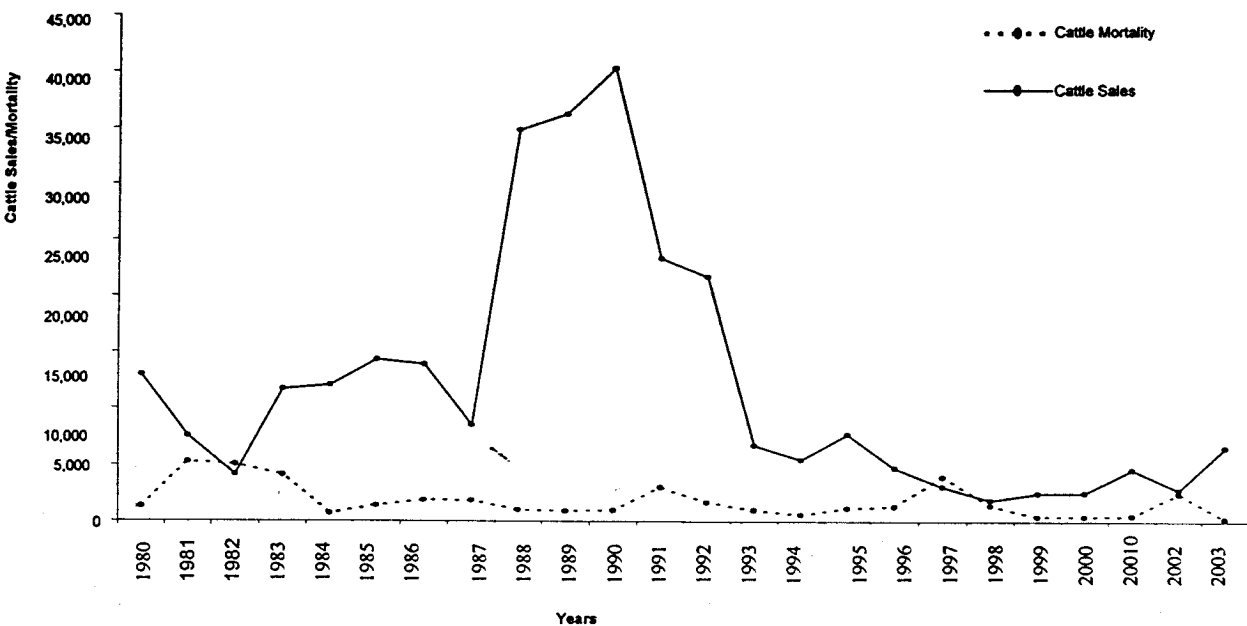


FIGURE 8: Cattle mortality and sales from 1980-2003 for Monze district.

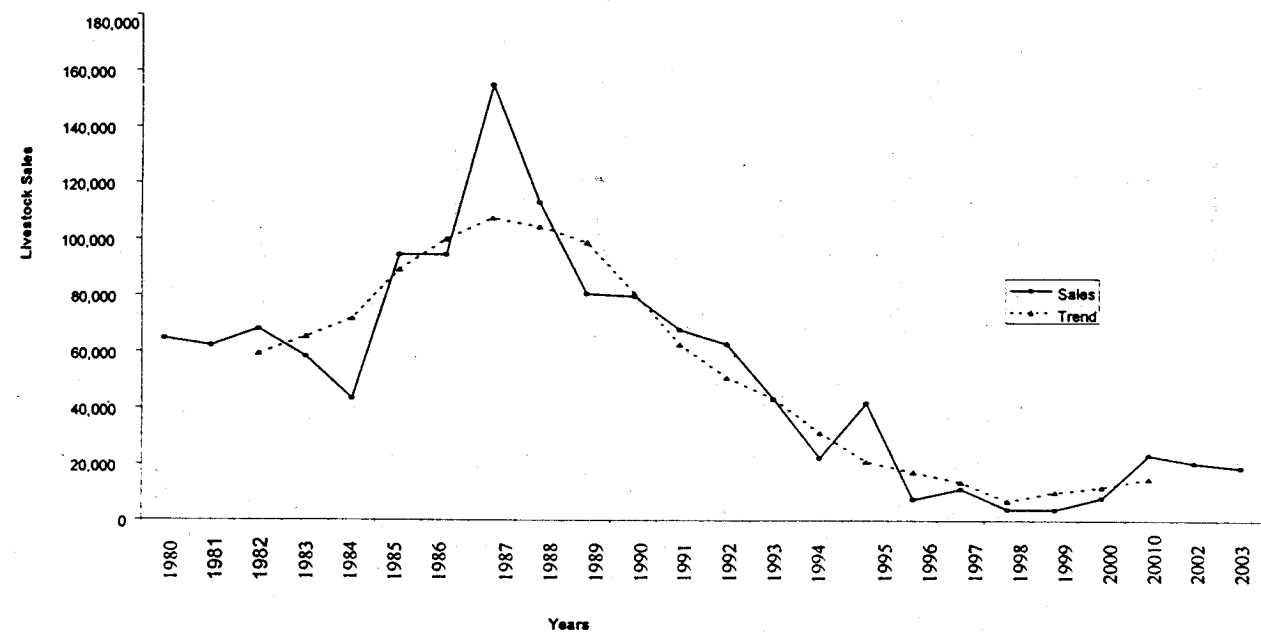


FIGURE 9: Trend analysis in livestock sales based on observed and 5-year moving averages, 1980-2003.

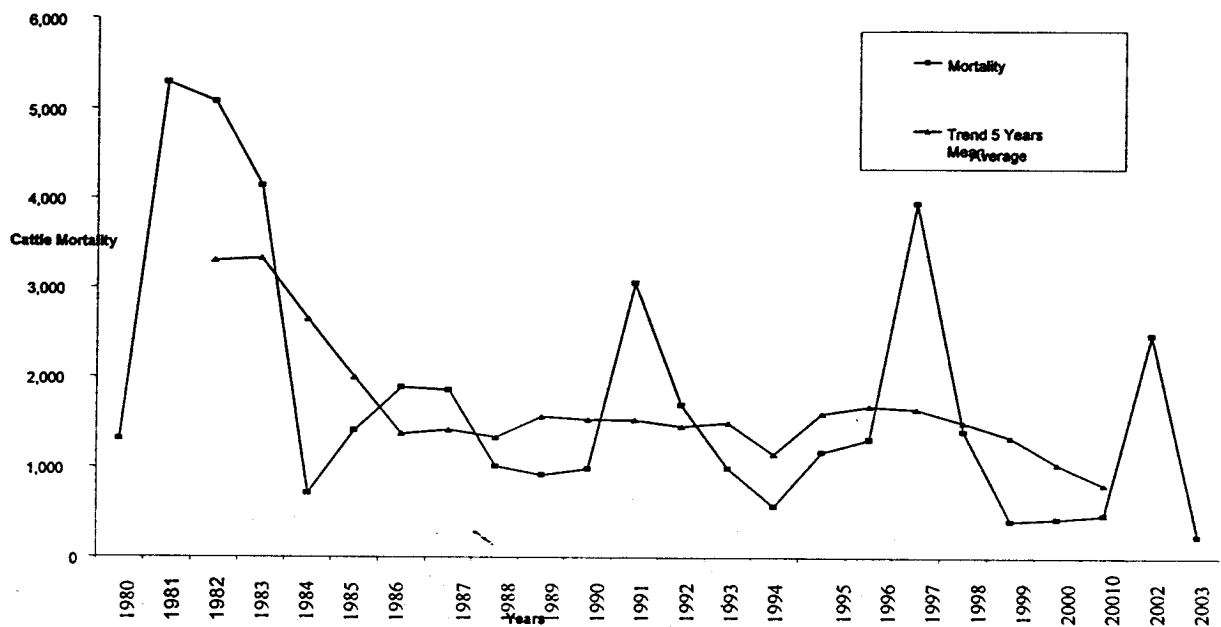


FIGURE 10: Trend analysis on cattle mortality based on observed and 5-year moving averages, 1980-2003.

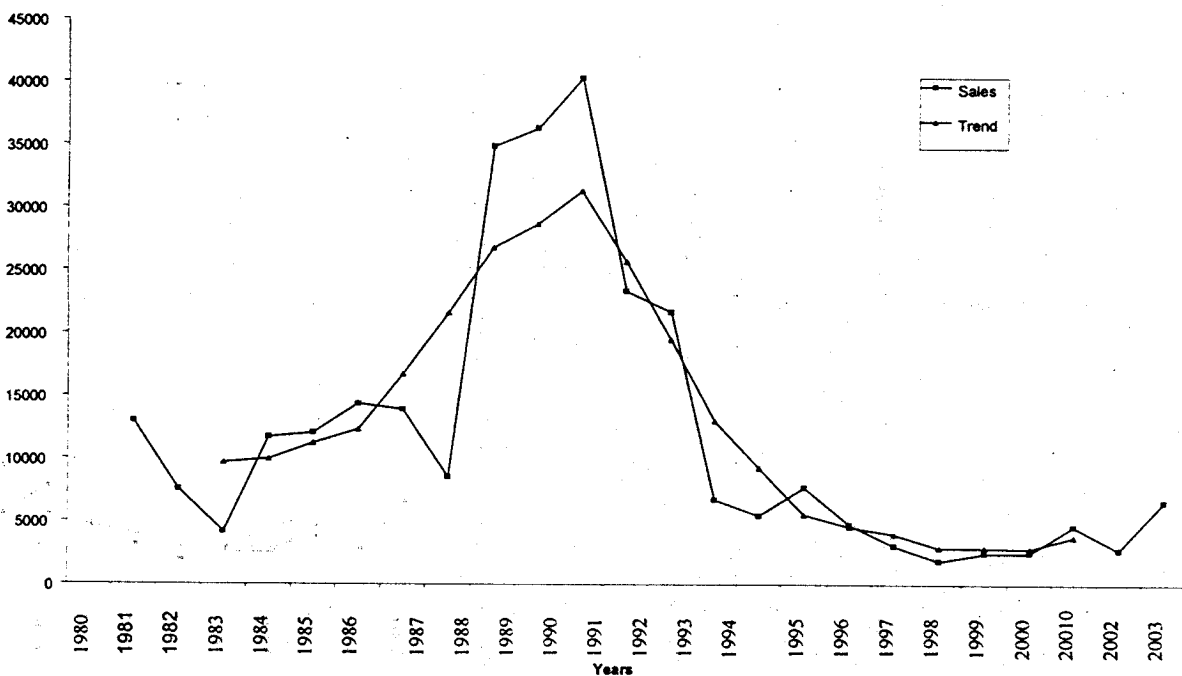


FIGURE 11: Trend analysis on cattle sales based on observed and 5-year moving averages, 1980-2003.

TABLE 5: Livestock export for slaughter or sale out of Monze district.

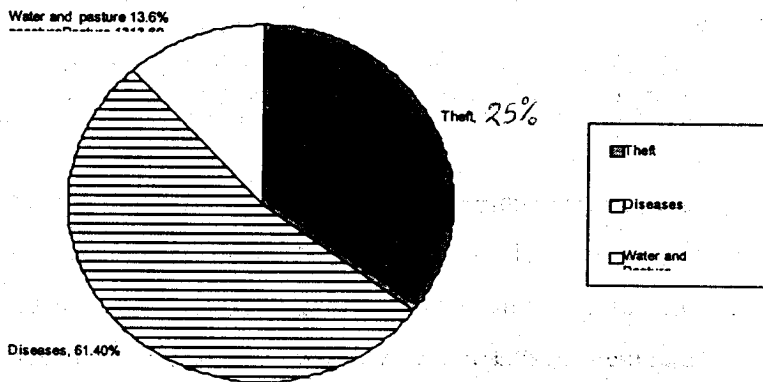
Year	Cattle (Bovine)	Goats (Arcin)	Pigs (Prine)	Poultry (Avian)	Total
1980	12,998	609	2,441	48,644	61,692
1981	7,582	1,705	753	52,151	62,191
1982	4,156	298	807	62,722	67,983
1983	11,725	1,421	1,179	43,876	58,201
1984	12,080	1,831	2,142	27,265	43,322
1985	14,362	2,107	1,997	76,452	94,315
1986	13,912	3,364	1,695	75,344	94,318
1987	8,538	2,050	1,456	142,844	154,888
1988	34,861	1,295	1,598	75,271	113,025
1989	36,275	3,838	1,328	39,117	80,558
1990	40,309	3,524	5,334	30,513	79,680
1991	23,332	2,877	5,292	36,286	67,787
1992	21,681	7,420	4,951	28,716	62,768
1993	6,737	3,620	1,316	10,410	22,083
1994	5,461	2,682	1,449	12,799	22,391
1995	7,708	10,100	5,545	18,542	41,895
1996	4,728	623	910	1,232	7,499
1997	3,066	748	309	6,978	11,180
1998	1,882	444	355	1,188	3,869
1999	2,497	356	182	739	3,774
2000	2,514	540	722	4,240	8,048
2001	4,604	2,835	3,466	12,470	23,440
2002	2,782	3,748	2,643	11,321	20,494
2003	6,564	5,894	341	5,964	18,763

An analysis of trends in livestock sales and cattle mortality indicates that in periods of drought, there were general increases. Though after 1990 the trends show a decline (Figures 8,9,10,11 and Table 5), this could have been as a result of local communities in the district having had lost their livestock due to diseases, theft and relocation to Central province where drought was less prone.

An analysis of the effects of drought on prices of livestock and crops indicates that prices moved up during drought years. Findings show that 23 households reported an increase, 15 a decrease and 4 no change in prices and these accounted for 52.3%, 34.1% and 9.1% of the responses respectively. However, this is not entirely true because FGDs revealed that the prices of livestock become lower during droughts on account that buyers from towns dictated the prices to the disadvantage of local farmers.

In Ufwenuka and Bweengwa wards, people were reported going hungry in 1992 and 1995 despite having livestock that they could eat or sell for grain. Perhaps, it was because of the Tonga traditional values of keeping livestock (especially cattle) for prestige, funerals, bride price and initiation ceremonies where animals were slaughtered. This was done in the hope that some animals would survive the drought, so that the household would retain an endowment once the drought was over. As a result, many animals either died or were sold in such poor health conditions that their selling prices dropped to very low levels.

Households were also asked to provide reasons why they sold some of their livestock. Frequency analysis of results indicated that the reasons were to raise money for school going children (79.5%); food (72.7%); avoid the risk of losing them during drought (47.7%) while 11.4% said it was due to inadequate water and pasture. An analysis on households loss of livestock revealed that this was due to a number of reasons including diseases (61.4%), theft (25%) and inadequate water and pasture (13.6%) illustrated in Figure 12.



Source: Field data compilation

FIGURE 12: Pie chart showing household livestock losses.

This research revealed that in 2002, in Hanamaila village of Ufwenuka Chiefdom, 22 people were hospitalized after eating poisonous mushrooms. In Bweengwa ward, it was reported that one family was poisoned through eating wild tubers. This resulted in the death of one child. In 2002, physical education in schools was cancelled and children were reported collapsing in schools because they left their homes going to school with empty stomachs. Pupils' school attendances were poor and most pupils

failed to meet school requirements while many were malnourished. Monze Diocese annual reports indicated that teachers could not work effectively due to hunger and related issues like demands from families, extended relatives and neighbours. Women and children made as many trips as possible a day in 1992 and 1995 to fetch and carry water over long distances on their heads (waking up as early as 03:00hrs). This drudgery kept them away from performing other domestic functions.

The hungry population reported drought periods in study wards as having been accompanied by an increase in behavior classified as anti-social such as prostitution, theft, assaults, witchcraft and adultery. The ward councilor for Monze reported that in 2002, a shop was looted by a hungry and an angry mob for selling some grains that was suspected to have been relief food.

The drought effects were also observed. For instance, the researcher observed that during droughts of 1992-95 and 2002-3 year periods, there was widespread loss of forest habitat. Farmers' increased need for agricultural land with high moisture storage capacity and fuel-wood had left areas not occupied by settlers bare especially in Ufwenuka ward. It was inevitable that the degradation of lands and depletion of renewable forest resources would in turn cause serious environmental problems like deforestation and soil erosion, which ultimately led to desertification.

5.6 Correlation analysis

The correlation analysis of the relationship between the annual rainfall, cattle mortality and cattle sales were done using matrices based on Statistical Packages for Social Sciences (SPSS) statistical analysis. The results are shown in Tables 6 and 7.

TABLE 6: Bivariate correlation coefficients between rainfall (VAR 00001) and cattle mortality (VAR 00002).

Descriptive Statistics

Variable	Mean	Standard Deviation	N
VAR 00001	722.2458	208.2231	24
VAR 00002	1777.6250	1467.0601	24

Correlations

Variable		VAR 00001	VAR 00002
VAR 00001	Pearson correlation	1.000	-0.093
	Significant	.	0.665
	N	24	24
VAR 00002	Pearson correlation	-0.093	1.000
	Significant	0.665	.
	N	24	24

TABLE 7: Partial correlation coefficients between rainfall (VAR 00001) and cattle mortality (VAR 00002) while cattle sales (VAR 00003) is controlling.

PARTIAL CORRELATION

Variable	Mean	Standard Deviation	Cases
VAR 00001	722.2458	208.2231	24
VAR 00002	1777.6250	1467.0601	24
VAR 00003	12098.0833	11252.0833	24

---PARTIAL CORRELATION COEFFICIENTS---

Controlling for--		VAR 00003		
VAR 00001	VAR 00002			
VAR 00001 (0) (P = 0.0)		1.0000 (21) P = 0.644	-0.1018	
	VAR 00002 (21) P = 0.644	-0.1018 (0) P = .	1.0000	
(Coefficient / (D.F.) / 2- tailed significance)				
“. “ is printed if a coefficient can not be computed				

* the partial correlation (coefficient) of VAR 00001 with VAR 00002 controlling for VAR 00003 is -0.1018.

* the degrees of freedom (d.f.) are 2

* the exact significance (2-tailed significance) is given to three decimal places (P < 0.644)

The bivariate Pearson correlation coefficient between annual rainfall and cattle mortality, which is very weak, was found to be - 0.093 at significant of 0.665. This means that the probability of achieving this correlation by chance is less than 0.665. There is no statistical significant negative correlation between annual rainfall and cattle mortality. The partial correlation between annual rainfall and cattle mortality controlling for cattle sales is -0.1018. The exact significant level (2 – tailed significance) is 0.644 which is a moderate value. There is no statistical significant negative correlation between annual rainfall and cattle mortality when sales is controlled for. Tests at 0.05 and 0.01 levels of significance indicate that at 0.05, the critical value (r-critical) for both correlations was 0.432 and at 0.01, r – critical value for both correlations was 0.537 (Bless and Kathuria, 1998).

5.7 Household response to warning against drought

The analysis revealed a wide range of responses by households if a warning was given of an impending drought. Households' responses are shown on Table 8.

TABLE 8: Response by households if warning was given of an impending drought.

Response	Number of Households	% of households
Look for paid employment	9	20.5
Store enough grain	6	13.6
Sell of livestock	10	22.7
Plant early maturing	7	15.9
Nothing	13	29.5
Trading	6	13.6
Migration to less drought areas	5	11.4
Pray to God/traditional Gods (shrines)	8	18.2
Plant near river banks	7	15.9

Source: Field data compilation

5.8 Coping measures before relief food

Retrospective interviews reviewed that 84.1% of the households had coping measures before relief food programmes, 13.6% did not have while 2.3% did not know. Table 9, shows some coping measures to drought among communities in various study wards before food relief.

TABLE 9: Activities carried out by households during drought before relief food programme.

Coping Strategy	Number of Households	% of households
Vegetable vending	19	43.2
Collection of wild resources	14	31.8
Livestock sales	12	27.3
Livestock for grain exchange	10	22.7
Hunting and trapping	9	20.5
Trading	9	20.5
Beer brewing and sale	7	15.9
Handicraft sales	5	11.4
Firewood and charcoal sales	4	9.1
Buying	4	9.1

Source: Field data compilation

The determination of coping strategies before the food relief programme revealed that women and children in Ufwenuka and Bweengwa wards were heavily engaged in vegetable vending during droughts. It was reported that women and children took up dry season riverbank and dambo gardening and marketed a proportion of their produce to boarding schools, colleges and Chikuni Vegetable Canning and Jam Factory in Ufwenuka ward. Few households managed to sell and exchange livestock for grain during droughts. This could have been as a result of small herd sizes (especially after 1990), poor conditions of livestock (cattle) and poor marketing opportunities.

During periods of drought, people in Ufwenuka and Bweengwa wards changed their diets towards alternative wild resources. These were reported to include wild fruits, leaves and roots or tubers. Local names (Tonga) of fruits include, *Musaansa* (berries), *Masuku*, *Matobo*, *Muchinga*, *Inji*, *Mbuku*, *Mpondo*, *Bustiika*, *Maabo*, *Nkiyu*, and wild tubers or roots included *Masyaabe*, *Munkoyo*, *Mpana* (water lilly) etc. This coping strategy was being practised during the whole study period. In Bweengwa and Ufwenuka wards, people reported having been engaged in trapping and hunting of small animals and birds.

Monze district annual (MACO) reports revealed that in the 1980s and 1990s, cattle sales were held by Zambia Cold Storage Company (ZCSC), supposedly as a means of allowing farmers of destock animals prior to major drought mortality. But early in the drought periods farmers were reluctant to destock, thinking that the rains might come

and cattle would survive. However, Table 4 indicates that during major droughts, there were increases in export of livestock for slaughter in Lusaka and the Copperbelt.

A variety of trading activities initiated by households were reported by 20.5% of the respondents. This was mainly dominated by women and children who concentrated on the purchase and selling of second hand clothes and the setting up of small business shops- *Tuntemba* (make-shift-stalls) in villages. Reported also were the continued practice of particular 'professions' such as traditional healing (*n'ganga* and herbalists) and the selling of love portions in Monze town. A village headman in Bweengwa ward reported that men were occasionally involved in illegal selling of cannabis (*lubanje*).

This research revealed that brewing and selling of beer were significantly higher coping strategies in early periods of drought, where households made sufficient profit to buy more grain for brewing and provide food for the family (illicit beer- *kachasu*, wine and *gankata* 'seven days brew'). Over 10% of households were engaged in making handicrafts, which included stools, baskets, mats, drums, hats, clay pots, axes and hoes (blacksmith). The discussions highlighted that these were concentrated in Ufwenuka (Chisuwo Village) and Bweengwa wards, (making use of connections with urban centers) and Monze Home Craft Centre (MHCC) and Stitching Nederlandse Virrijwilligers (SNV) in Choma for export opportunities. In Ufwenuka ward, crushing of stones was reported to have been initiated by local people during the 1990s and 2000s. It was an important alternative form of security especially in later parts of droughts when stones were sold to individuals, schools and colleges for construction purposes.

Coping strategies not highlighted in Table 9 included prostitution and church aid. Interviews and discussions indicated that prostitution was an important source of income especially among young, unmarried women and older divorcees. Trade concentrated around Monze and Chisekesi townships while others were reported to have migrated to larger towns and remitted cash to their rural homes hit by drought. In addition, there were reports of a certain amount of rural prostitution around beer parties. Monze and Chikuni parishes reported that a few households were associated with the church that handed out food and clothes. This provided additional support that complemented government aid.

5.9 Food relief programme

The study target groups were both male and female-headed households. Out of the sample of 44 households, 29 were male headed and 15 female headed which accounted for 65.9% and 34.1% respectively. The analysis showed that in study wards 42 households received some relief food while two did not, which is 95.5% and 4.5% respectively. Frequency analysis of how the food relief programme had affected household food availability problem indicates that 11.4% reported an increase, 22.7% a reduction and 65.9% reported no change on household food availability as illustrated in Figure 13. This, therefore, follows that food relief programmes had some negative impacts on improving the food availability situation in the study wards.

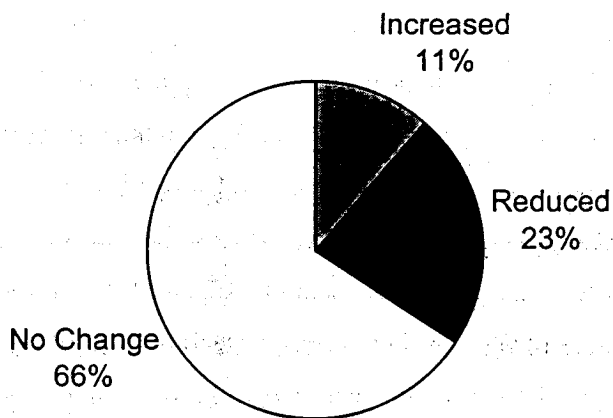


Figure 13: Pie chart showing effects of food relief programme on household food availability.

Through household questionnaires this study identified nine NGOs who were involved in food relief programmes. These were World Vision, Development Aid from People to People (DAPP), PAM, Peri –Urban Self Project (PUSH), Monze Diocese Agricultural Development (MDAD), Chikuni Parish (CP), Monze Parish (MP), Chikuni *Lusumpuko* (Development) and Programme to Prevent Malnutrition (PPM). Frequency analysis shows that all NGOs, 100% were involved in the distribution of relief food, 44.4% in the transportation and storage of the commodities, while seven focused on information dissemination which accounted for 77.8%. The

items stored, distributed or transported were reported to have been beans, rice, wheat, maize, and sorghum, soya, cooking oil, sugar, pulses and milk.

Fieldwork evidence on the determination of the relief food beneficiaries revealed that various methods of assessments were employed by the NGOs, in conjunction with government. These were community committees (village development committees) in operational areas; administering of WFP Questionnaires; Health ranking; Use of satellite PPM in health centers and through FGDs.

There was no significant difference in participation in food relief programme in study wards. Those in receipt of remittance income were significantly less involved in line with regulations, although it was reported that the numbers of those dodging these increased in with duration of droughts. By contrast, female-headed households, 77.8% were reported significantly more involved in relief food programmes. Reasons advanced by local authorities and NGOs were that women were the most vulnerable in communities and they keep children and orphans. However, 22.2% of NGOs were of the view that neither male nor female-headed households benefited most because the relief food distribution was not targeted at individuals but households and the methods of assessment determined who should receive or not. Each household had an equal opportunity of receiving relief food.

In another analysis it was found that political interference had influence on food relief programme. This was in food delivery, beneficiary identification and needs assessments that were reported to have been 44.4%, 33.3% and 22.2% respectively. But three NGOs (DAPP, PAM and PUSH) indicated they never had political interference in their operations. An assessment of people's willingness to participate in community work after the relief programme revealed that communities continued to use some skills acquired during FFW and Food For Assets (FFA) projects; and were more willing to do more work of infrastructure maintenance in operational areas.

5.10 Food for work programme

In the 1970s and early 1980s the district had been receiving food handouts from government in drought times. This research found that after the year 1980, the food relief programme changed from food handouts to FFW organized by local heads, village development committees (*Lusumpuko*) with the help of NGOs and the church

where projects were determined largely by local people. The food for work programme was a means of distributing food to all drought affected areas or Zambians who were in position to work for it. It was strictly a self-help scheme that would be beneficial to the entire community. In the study wards, it involved the following projects as shown in Table 10.

TABLE 10: Food for work projects carried out by households in Bweengwa, Ufwenuka and Monze wards.

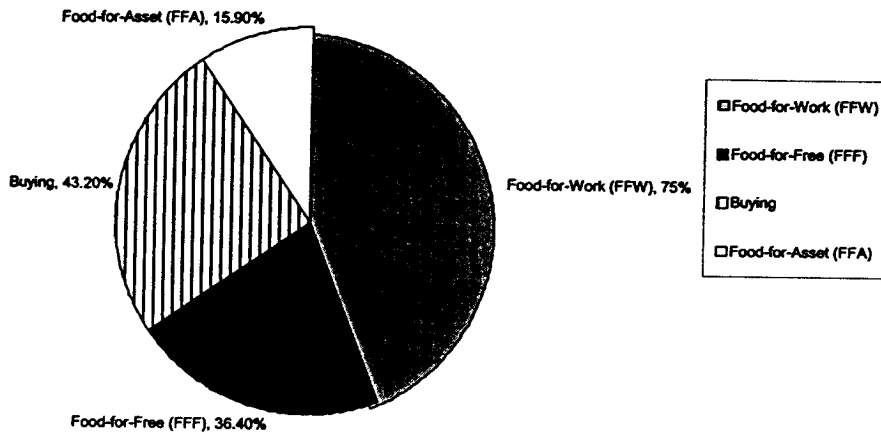
Activity	Number of Households	% of households
Dam construction	19	43.3
Rehabilitation of feeder roads	35	79.5
Clinic construction	6	13.6
Pit latrine construction	27	61.4
School construction	14	31.8
Brick moulding and baking	11	25.0
Bridge construction	23	52.3
Shelter for patients caretakers	7	15.9
Others	22	50.0

Source: Field data compilation

* Others * include dip tank construction, canal building, fields clearing, wells deepening, stone crushing and storage (barns) construction.

Those in receipt of remittance income were significantly less involved in FFW activities in line with the regulations. By contrast, female-headed households were significantly involved in FFW activities as reported by NGOs; 77.7% compared to 22.3% male-headed households.

An analysis of the methods of food relief distributions indicates that four methods were employed on how the food would reach intended beneficiaries. There was free food for only those who could neither purchase nor work for it. These included the terminally ill, aged and malnourished children. The other method was food for work (FFW), payment for their labour. Those with money could purchase the food at subsidized prices and there was also food for assets (FFA), communities were running small businesses and contractual groups. As can be seen in Figure 14, the major method of relief food distribution was FFW (75%).



Source: Field data compilation

FIGURE 14: Pie chart showing food distribution methods.

The positive effects of recent droughts in the study wards were the FFW projects. Drought relief was not meant to create a future dependency on food donations. Communities in Monze should not be encouraged to ask for and expect handouts from government, donors and NGOs. Instead, they should continue to buy and work for their food as they would in normal times, so that once the drought emergency passed, their tradition of self-sufficiency would continue.

Discussions and interviews with NGOs, the church and emergency committees revealed that the FFW programme brought tangible improvements in the study area. Communities themselves determined which projects were most needed in their areas and community members were trained how to maintain them. It was a method that brought about socio-economic development and food security in the district. Equipment and machinery that were being used during drought relief were turned over to NGOs and the church. These included tractors, bicycles, tarpaulins, hand tools (shovels, picks, hoes, wheelbarrows) and many others.

Frequency analysis on the ability of households to determine the impact of FFW programme on community development indicated that the programme had a positive impact on the community. The results showed that 59.1% of households were of the

view that the programme enhanced community development, 25% indicated no change while 15.9% viewed the programme to have retarded community development. Interviews from local authorities (NGOs) indicated that 88.9% of FFW and FFA programmes improved community development, 44.4% improved income-generating activities, which included brick moulding and stone crushing in study wards.

There was overwhelming response from NGOs that the FFW need for operations should continue, 77.8% responded positively to the operation's continuity while only 22.2% responded negatively. The reasons which were given for the operation's continuity were that: projects undertaken (e.g. dip tanks, toilets, storages and feed roads construction) were for socio-economic enhancement of the lives of local communities; the district still continued experiencing poor rains and food insecurity; FFW is better than food handouts though the food given did not compensate the time lost; and FFW encourages self-reliance and hard work while free food encourages laziness. In contrast, the 22.2% felt that people should be given cash to buy supplements for their diets and other requirements.

During discussions, it was revealed that supplementary feeding programmes with the assistance of WFP had helped during drought periods after the 1980s. Merely delivering grain to hungry people is not enough to ensure that their health does not deteriorate. Health centers and NGOs gave supplementary feeds to under-five children, pregnant and lactating mothers, the terminally ill, the aged and some of those who participated in FFW projects. The food had high-energy supplements like peas, beans, soya, rice, pulses and cooking oil.

5.11 Criticism of food for work programme

In the same way some politicians sought political gains from attacking the programme, the community criticized the operation as taking unfair advantage of people's distress. 'FFW', some people lamented, 'amounted to slavery'. They complained that people should not be forced to work so as to receive food when they were already in a weak and desperate state. Instead as emphasized by Monze Diocese Agricultural Coordinator, those involved in FFW programmes should be given cash as payment for their labour instead of food so that they could buy other necessities.

CHAPTER SIX

DISCUSSION OF RESULTS

6.1 Drought occurrence and severity

Meteorological drought occurrence in the study wards were observed to occur contemporaneously although those of Ufwenuka tended to be of longer duration for the same period. This is exemplified by the durations and severity indices of drought. Table 3 shows that the longest and most severe droughts in the study wards were in the 1990s (between 1990 and 1996). The longest being a 7- year drought event with severity index of -7.9 in Monze, followed by a 6- year drought event with severity index of -3.8 in Bweengwa and a 4- year drought with severity index of -3.6 in Ufwenuka ward. It is observed that drought severity increased with duration, the longer the duration the greater the severity. There are differences in periods and frequencies of drought occurrences (Ufwenuka 9, Monze 11 and Bweengwa 7). Similarly, after 1980, meteorological and agricultural droughts in study wards generally increased. This could have been a result of decreased rainfall experienced in the district (Figures 7 (a), (b) and (c)).

However, the relationship between meteorological droughts as defined by a rainfall related index and the effects on agricultural or livestock production is not always clear. Responses equally change. Under different economic conditions affected by such factors as changing quality of off-farm income and scope of government intervention, responses differ.

6.2 Agricultural activities

In the study wards, agricultural activities brought out clearly the type of farmers found there. Figures 6 (a) and (b) show that most crops grown are food crops (maize, groundnuts, peas and sweet potatoes). This entails that most of the households are small scale peasant farming communities, who mainly depend on rain-fed type of agriculture. There is the rearing of indigenous breeds of livestock. This is exemplified by a largest number of households keeping traditional village chickens, cattle and

goats. This therefore reaffirms the findings of the Tonga's traditional values of keeping of livestock for prestige, funerals, bride price and initiation ceremonies. For instance, cattle are considerably more valuable livestock (for draught power, manure, and milk) than dead (sold). These are very strong incentives to try and maintain.

6.3 Drought socio- economic effects

Despite the calamitous effects of drought, the fact remains that they do not have a general effect or affect everyone indiscriminately. A detailed examination of the consequences of drought in study wards showed that the economic sector affected is agriculture, and particularly that involving subsistence crop and livestock production. Thus, the first and certainly biggest impact was on those social strata that are less equipped in economic and political terms. By affecting the poorest most drastically, the drought reinforced the already accentuated difference between rural and urban populations.

The socio- economic costs of drought in the district are high. The loss of livestock between 1980 and 2003 is a huge burden to be carried by an already weak rural economy. Figure 9 and Table 4 show that livestock sales and cattle mortality increased generally during drought periods. Though after 1990, the trends show a decline, this could have been as a result of local communities having had lost their livestock due to diseases, theft and relocation to Central province where drought was less prone. In study wards, the value of cattle can be calculated according to their functions. Cattle provide a variety of functions ranging from draught for ploughing and transport, to milk and manure production, to bride price (*lobola*), to capital growth or sale. Sale rates increase during drought periods. This is only significant, however, in very severe droughts. Table 3 shows that drought stress sales were the result of regular income needs such as food as observed in earlier findings.

In 1992 and 1995, communities were going hungry in Bweengwa and Ufwenuka despite having livestock that they could eat or sell for grain. Perhaps, it is because of the 'Tongas' traditional values of keeping livestock for prestige, funerals, initiation ceremonies and bride price where livestock is slaughtered or exchanged. This is done in the hope that some animals would survive the drought, so that households would retain an endowment once drought was over. As a result, many animals either died or were sold in such poor conditions that their selling prices dropped to very low levels.

Group discussions showed that the prices of livestock become lower during droughts because buyers from towns dictated the prices to the disadvantage of local farmers.

Drought in 2002 led to the loss of four human lives in Bweengwa and Ufwenuka wards through the consumption of poisonous mushroom and wild tubers. Education standards reduced during the same period as physical education was cancelled in schools because pupils were collapsing as a result of severe hunger. Women and children had to walk long distances fetching for water, a drudgery that kept them away from performing other domestic functions. The severe hunger had been accompanied by anti-social behavior such as looting, prostitution, theft, witch craft and adultery.

6.4 Correlation of rainfall and cattle deaths

In Table 6 and 7, the correlation between annual rainfall and cattle mortality was -0.093 (not significant at 5% level with a two – tailed test). However, the correlation between annual rainfall and cattle mortality controlling for cattle sales rises to -0.1018 (not significant). There is no statistically significant negative relationship between annual rainfall and cattle mortality when cattle sales is controlled for. The level of significance implies that 64% of the cases challenged the validity of the null Hypothesis. Rainfall amount does not in any way influence cattle deaths. The change in rainfall amounts is to a very small extent matched by the change in cattle mortality in the district. These correlations show that other factors play a major role in the number of cattle deaths. These results, therefore, reaffirm the results which showed that most households (61.4%) lost livestock due to diseases (Figure 12). For both tests (at 0.05 and 0.01 levels of significance), null Hypotheses were accepted and alternative Hypotheses were rejected, since $r - \text{criticals}$ are more than $r - \text{calculated}$.

6.5 Response to drought effects

Human responses to drought show that women and children cultivated vegetables along river banks and marketed a proportion to earn some income. Tables 4 and 9 show that drought periods were characterized by local responses involving exchanges of livestock for grain, collection of wild foods and migration. Localized production failures were offset through exchange of livestock assets for grain and the collection of wild products especially in the 1970s and 1980s. The recurring theme of

commentaries from the 1970s to 1990s is the importance of livestock (especially cattle) as exchange entitlement during drought in the district.

A number of trading activities dominated by women and children are undertaken during droughts. Table 9 shows that activities included the sale of second hand clothes, illegal selling of cannabis, selling of beer, traditional healing and the sale of herbal medicine of love portions and handicrafts. In the 1990s and 2000s, in Ufwenuka ward, stone crushing was an important alternative form of security especially in later parts of droughts where stones were sold for construction purposes. Trapping and hunting of small animals and birds increased in drought times. This finding supports the idea that local communities (Tongas) will choose inferior or restricted diets (even if they have plenty of livestock) in order to preserve their assets in case of further drought and economic stresses the following year. Prostitution in townships (Monze and Chisekesi) was an important source of income especially among the young, unmarried women and older divorcees. Prostitutes remit cash to their rural homes hit by drought.

In the 1970s, drought effects were patchy and there seemed to be no large scale response required by government. Notable responses in Table 4 were gathering of wild resources and local exchange of livestock for grain between surplus and deficit areas was sufficient to sustain local communities' food supplies. In the 1980s, drought struck hard with major crop failures and cattle deaths which required major relief efforts. By early 1990s, the importance of livestock (especially cattle) as an exchange commodity and a source of drought security had been seriously reduced (Figure 9). Drought responses had been characterized by an increase reliance on external claims on the government and NGOs in form of drought relief (Table 4). The WFP through NGOs such as the World Vision, PAM, Peri-Urban Self Help (PUSH) and Development Aid from People to People (DAPP) introduced food relief programmes, which included FFA and conservation farming.

Tables 8 and 9 show that in the face of drought, communities in study wards chose from a wide range of purposive responses and actions intended to mitigate the effects. These included making their crops or livestock less vulnerable to lack of water, modifying the shortfalls of available moisture, making food security position stronger by storing enough grain to bearing and sharing the losses of crops and animal

production by doing nothing, and turning to God or traditional Gods for help in such times.

6.6 Food relief programmes

It was observed that the food relief programme had some negative effects on improving the food situation in the study wards. But there were mixed opinions on this as data collected showed that 65.9% households pointed out that the programme did not reduce food deficit problems. Conversely, 22.7% of households reported a reduction in food availability, while 11.4 showed an increase in food availability during drought (Figure 13)

In the study wards, nine NGOs were involved in food relief programmes. These were involved in the distribution, storage and transportation of relief food and information dissemination. The NGOs used various methods of relief food beneficiaries' identification. Methods of assessment included the Village Development Committees (VDCs) in operational areas, WFP questionnaires, health ranking, the use of satellite PPM in health centres and through FGDs. Female-headed household (77.8%) were significantly more involved in relief food programmes as NGOs showed that women are most vulnerable in communities. There were political interferences on the food relief programme in food delivery, beneficiary identification and needs assessments. This study revealed that communities in study wards were more willing to participate in community work after the programme because of some skills they acquired during FFW and FFA projects.

6.7 Food for work programme

The positive effects of recent droughts in the study wards were FFW projects (Table 10). This method of relief food distribution encouraged the introduction of community-based projects initiated and executed by people, all of whom were food recipients. Drought relief was not meant to create a future dependency on food donations. Communities in Monze should not be encouraged to ask for and expect handouts from government, donors and NGOs. Instead, they should continue to buy and work for their food as they would in normal times, so that once the drought relief emergency passed their tradition of self-sufficiency would continue.

FFW programme brought tangible improvements in study wards. Local communities themselves determined which projects were most needed in their areas and community members were trained how to maintain them. Most of the households, 75% were involved in the FFW programme (Figure 14). It was a method that brought about socio-economic development and food security in the district. Most projects as can be observed from Table 8 were mainly oriented towards the enhancement of agriculture, health, education and transport for communities in study wards. Equipment and machinery that were being used during drought relief were turned over to NGOs and the church. These were given to communities with the understanding that they would remain with recipients for use in agriculture and in on going rural development projects after drought in the district.

However, some sections of the community criticised the operation as taking unfair advantage of people's distress. Those involved in the programme should have been given cash as payment for their labour. Newly constructed toilets which were not properly maintained became a health hazard too.

6.8 Obstacles to effective planning for drought

Four obstacles to effective planning for droughts in Monze district are (i) **Specificity**; planning for droughts presuppose that they are well defined and discernible to all. This lack of specificity is a major contributing factor as to why the planning for droughts has received less attention than they deserve. (ii) **Randomness**; droughts' sporadic nature is what inhibits the planning for water shortages. (iii) **Drought phenomenon**; although droughts do affect individuals, in reality droughts are a community problems having characteristics of Hardin's famous 'Tragedy of the commons'. The self interest of each individual using communal property is to maximize it for immediate gain. (iv) **Costs of droughts**; The lack of information about the cost of droughts is why only marginal interest exists in planning especially at district level. The magnitude of drought costs is assumed to be less because the losses associated with them generally are incurred during short periods of time.

6.9 Achieved objectives

This study achieved many of its objectives. **Drought occurrence**; the precipitation data analysis using simple drought index indicates that drought in Monze is a occurrence (Table 2). **Drought characteristics**; the non-overlapping droughts of at

least 2-year duration or more with greatest climatological effects were in the periods of the 1980s, 1990s and 2000s. Drought severity indices in the period 1990-1996 were high for all study wards implying that drought was greatest and caused severe suffering among the local communities (Table 3). **Drought effects;** there are negative and positive effects of the drought in study wards. The drought has had long-term negative effects because vital long-term agricultural capital for peasant farmers, particularly draught animals were lost (Tables 4 and 5). This was especially of 1982-85, 1992-95 and 2002-03 where severity indices were high.

Impacts of the FFW projects; the positive effects of drought were food relief projects which tremendously enhanced the community livelihood systems in the study wards. The projects like rural water supply and people's involvement give a better health for all, less cost, more local control and self reliance (Table 10). **Drought responses;** the traditional responses to droughts in study wards notes that despite their simplicity, responses act as important mechanisms for alleviating social stress among affected persons (Tables 4, 8 and 9). Similarly, external support from NGOs, government and local networks will certainly remain key in sustaining livelihood in study wards. **Roles of NGOs;** the local authority play a pivotal role during droughts in information dissemination, relief food distribution, storage and transportation to needy areas. They also gave supplementary feeds to under-five children, pregnant women, terminally ill, the aged and other people who participated in FFW projects.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions and summary

Drought is and always will be one of the dominant problems facing Monze district and the sooner this fact is recognized and plans made with this reality, the better the chance will be of minimizing losses of livestock. Drought has had a long-term effect because vital long-term agricultural capital for peasant farmers, particularly draught animals were lost. Massive crop failures and livestock losses especially in periods of 1982-85, 1992-95 and 2002-2003 were deduced when the drought severity indices indicated were high. Droughts in the study wards were found to have an effect on livestock. For instance, loss of livestock (especially cattle) have had an impact on cultivated areas, transport and indeed on the bargaining power on social affairs such as marriages, and other festivals. But bivariate correlation analysis between annual rainfall and cattle mortality results indicated that there was very low negative relationship (-0.093). Similarly, the partial correlation between annual rainfall and cattle mortality when cattle sales data set was controlled for was a very low negative relationship (-0.1018). Though, high cattle mortality was observed during low rainfall, this could have been deaths due to diseases as reported by 61.4% of households. The severe social effects of droughts that were reported included mass hunger, malnutrition and severe water crisis.

The positive effects of droughts were FFW and FFA projects where households received relief food as payment for their labour. These brought tangible improvements in study wards. For instance, it can be concluded that rural water supply projects and people's involvement give a better health for all, less cost, more local control and self-reliance. These institutions and practices during relief operations not only helped mitigate the effects of droughts but also were a significant accomplishment in the study wards. All projects were fundamental because they involved self-help principle entailing people to work to improve their areas and lives, and in return they received food to feed their families. They improved their quality of

life, whether to make the villagers healthier and cleaner, make its markets accessible (through the construction of feeder roads) or its food security position stronger.

The external support from the state, local networks or rural-urban connections will almost certainly remain a key in sustaining livelihoods in the study wards. The traditional response to droughts in study wards notes that despite their simplicity, responses act as important mechanisms for alleviating social stress among affected persons. The range of local coping mechanisms is clearly inadequate during major droughts. The reduction in people's asset levels (especially livestock) over time has increased the vulnerability and added to poverty among rural communities. It has been observed that as a result of drought relief policies, the rural sector of the economy receives financial aid, which brings long-term benefits beyond the period of drought stress that would not otherwise be available i.e. grants, development projects and services. It can be concluded that rural development in some cases actually is speeded by drought. It may hasten the process of innovation and the adoption of new economic ideas, as were the case with FFW and FFA programmes.

The provision of safety nets for the most vulnerable requires attention. Monze Diocese and government's records in public support during times of drought had been impressive. Despite major food shortfalls in the district, the Government, Church, NGOs and Donor aid have managed to feed people in times of the crisis. However, it has been concluded that the cost had been enormous and growing. An alternative to the permanent supply of food aid to the communities must be sought. And much more important is the view of the range of local coping mechanisms which are needed in order to be able to target support more effectively and move beyond blanket access to either food aid or FFW schemes.

This research has shown how responses to droughts were varied in space and time among different social groups in the study wards. Farming is thus not an ordered and predictable affair but one highly influenced by contingency and uncertainty, embedded in social relations and patterns of economic differentiation. This makes the design of agricultural research and extension policy particularly challenging. Yet research and extension approaches often appear to ignore this fundamental finding. It can also be concluded that a more complete understanding of local responses to risk in drought conditions is clearly essential if more effective drought relief and mitigation

strategies are to be designed. Appropriate policies for coping with drought must therefore take the dynamics of local responses into account.

Lastly, it has been concluded that drought is a recurrent climatic phenomenon in Monze. In order to mitigate its effects and intensity, several measures can be taken. Hitherto, much emphasis has been laid on short-term measures thus neglecting the long-term ones, which are more effective in containing drought as observed by DAPP. Short-term measures such as food distribution and other relief aids to drought victims and water projects including the sinking of boreholes and wells (as was done in Monze) are palliatives. What is required is a comprehensive and integrated plan to contain drought. Such a plan should include the intensive and large-scale development and conservation of both surface and underground water resources of the district.

7.2 Recommendations

Based on the conclusions above, the following remedial actions or recommendations to drought effects and responses in Monze district were made.

1. NGOs operating in the district should encourage local communities on the need for diversification of income-earning options, so that people are less reliant on farm-based cash and can generate income from sources less dependent on the vagaries of rainfall.
2. There is need for extensive research to examine the importance of wild plants and other foods in different agricultural systems, for these 'hidden' resources often contribute significantly in times of hardships to the welfare of the poorer social groups by providing income or meeting dietary needs especially during drought.
3. The government and the private sector should promote rural credit facilities that can be accessed by farmers with the appropriate legal framework that will promote repayment.
4. The government, NGOs and private sector should make necessary investment in irrigation systems to small-scale farmers if the subsidized and free agricultural inputs are to be fruitful. This should be done in some form of

partnership whereby the government and NGOs provide dams, weirs and major canals from the source of water while farmers would provide open canals to their fields.

5. The Food Reserve Agency (FRA) should ensure that silos have at least a two-year supply of grain at all times. This requires proper marketing strategies and a policy framework that will enable FRA to collect surplus grains from all corners of Monze district and provide acceptable farm gate price.
6. The Agricultural Extension Officers should encourage farmers in the district on the need for early planting of grain and soil improvement technologies like conservation farming that lead to conservation of water. This could be the best way of ensuring a reasonable harvest of crops in drought years.
7. Development plans for drought in the district must take into full consideration the traditional systems of resource utilization of indigenous pastoralist, so that development of proposals will be based on existing structure and be acceptable to the owners of land and livestock.
8. A long-term best remedy to the socio-economic effects of drought is to increase the budgetary allocation to research in Zambia. Adequate funds must therefore be made available by the government and donors to the Meteorological Department to improve their observatory network and disseminate the necessary weather observations regularly and provide services to the agricultural sector.
9. There is need for the government, donors, NGOs and the private sector to encourage crop diversification through the growth of drought tolerant crops in areas prone to drought as the surest way of ensuring food security in the district. This could be done by expanding support and intensifying the promotion and utilisation of drought resistant crops by targeting more material and human resource inputs, and appropriate information and guidance on village level diversification and storage applications.

10. There is need for the introduction of wetland farming especially in Bweengwa ward. This can be a practical long-term solution to the effects of drought in the district. Farmers will not only be able to have enough food during times of adversity, but they can sell the surplus at a good price.

11. The government and the private sector should start developing drought plans and programmes in the district which should focus on lessening societal vulnerability to droughts. Such programmes should research and develop out-reach programmes that stress risk management measures rather than crisis management actions for decision makers in the public and private sectors.

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APPENDICES

APPENDIX A (I) HOUSEHOLDS QUESTIONNAIRE

SECTION A

Instructions: Tick or fill in the spaces provided.

Background information

- 1.0. (a) Ward.....
(b) Village.....
(c) Sex of head of household: A. Male [] B. Female []
(d) Marital status: A. Married [] B. Single [] C. Divorced [] D. Widowed
(e) If married, type of marriage A. Monogamous [] B. Polygamous []
(f) Predominant language spoken in the household.....
- 1.2. Literacy/education: A. None [] B. Primary [] C. Secondary [] D. Tertiary []
- 1.3. Major source of income: A. Farming [] B. Paid employment C. Trading []
- 1.4. Tenure of land or home: A. Tenant [] B. Owner [] C. Communal []

SECTION B

This section mainly attempts to ascertain farming, the effects of drought and human responses to it among households in study sites.

- 2.0. Are you engaged in any farming activities? A. Yes [] B. No []
- 2.1. If A to 2.0, list the – crops grown
.....
-livestock kept.....
- 2.2. If you keep livestock, why do you sell some of it?
A. To raise money for school going children []
B. Due to inadequate water and pasture []
C. To avoid the risk of losing them in the face of drought []
D. To raise money for food []
- 2.3. In what ways do you mainly lose your livestock?
A. Theft [] B. Diseases [] C. Inadequate water and pasture []
- 2.4. What has been the effect on the prices of livestock and crops during droughts?
A. Increase [] B. Decrease [] C. No change []
- 2.5. What would you do if warning was given of an impending threat to drought?.....
.....
.....

2.6. Do you receive any kind of relief food in times of drought? A. Yes [] B. No []

2.7. If A to 2.6, what form of relief food aid? A. Food for work [] B. Food for free [] C. Food for assets [] D. Buying []

2.8. If A to 2.7, what food for work projects had you been involved in?.....
.....
.....

2.9. In what ways has the food relief programme affected your household food availability problem during droughts?
A. Increased [] B. Reduced [] C. No change []

3.0. What has been the impact of the food for work programmes on the community development in this area?
A. Enhanced [] B. Reduced [] C. No change []

3.1. What have been your coping measures to food shortages before the relief food programme during droughts?.....
.....
.....

3.2. In your area, name the institutions/Non-Governmental Organisations that were involved in the food relief programmes?.....
.....
.....

3.3. What roles did these institutions/NGOs in 3.2. played?
A. Distribution [] B. Transportation [] C. Storage [] D. Information dissemination []

THANK YOU VERY MUCH FOR YOUR COOPERATION



APPENDIX A 2

LOCAL AUTHORITIES QUESTIONNAIRE

Instructions: Tick or fill in the spaces provided.

1.0. Name of the organisation

1.1. Position of the respondent.....

1.2. Was your organization involved in the food relief programme?.....
.....

1.3. What role did your organization played during the food relief programmes?
A. Distribution [] B. Transportation [] C. Storage [] D. Information dissemination []

1.4. What foods did you stored/transported.....
.....

1.5. State how you were choosing the beneficiaries of the food relief programmes.....
.....
.....

1.6. Who benefited most in the communities between male and female-headed households? A. Male [] B. Female []

1.7. Give reasons for your response in 1.6.....
.....
.....
.....

1.8. Did you experience any political interferences in your food relief programme?
A. Needs assessment [] B. Beneficiary identification [] C. Delivery [] D. Others
.....
.....

1.9. Do you think the food for work should continue?.....

2.0. Give reasons for your response in 1.9.....
.....
.....

- 2.1. What were the coping strategies or responses of local communities in times of drought?.....
.....
.....
- 2.2. What activities have improved in your operational areas since the introduction of good for work programmes?
A. Income generating ventures [] B.Community development []
C.Others.....
- 2.3. What infrastructure have been constructed in your operational areas as a result of food for work programmes?.....
.....
.....
- 2.4. What had been people's willingness to participate in community work after the relief food programmes?.....
.....
.....

THANK YOU VERY MUCH

APPENDIX A 3

GUIDELINES FOR FOCUS GROUP DISCUSSIONS (FGDs)

- 1.0. The socio-economic effects of drought in study wards (1970-2003).
- 2.0. How the local communities had responded or the choices / initiatives taken to mitigate the impacts of droughts.
- 3.0. The positive and negative impacts of the food for work programmes in the district.
- 4.0. What food for work and food for asset were carried out in the study wards.
- 5.0. Obstacles to drought planning in the district.

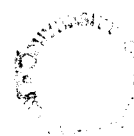
APPENDIX B 1

ANNUAL RAINFALL FOR STUDY WARDS, 1970-2003

Year	Chikuni(Ufwenuka) (mm)	ZCA(Monze) (mm)	Magoye(Bweengwa) (mm)
1970	757.2	644.9	-
1971	694.9	766.1	-
1972	930.7	779.0	-
1973	623.6	740.5	-
1974	1240.3	1063.0	-
1975	859.0	743.2	-
1976	842.3	815.8	-
1977	703.9	685.1	-
1978	1084.6	1138.7	1121.4
1979	805.8	678.5	821.0
1980	1082.6	756.0	599.3
1981	978.0	826.0	751.9
1982	591.0	541.0	681.8
1983	656.5	786.2	701.5
1984	445.6	578.5	566.4
1985	704.6	809.7	809.1
1986	1028.0	1115.6	740.0
1987	826.0	608.2	572.0
1988	675.1	738.6	624.6
1989	1017.5	1061.9	839.4
1990	786.3	629.8	826.4
1991	629.6	207.9	636.4
1992	573.0	498.8	650.3
1993	874.0	552.9	627.0
1994	556.4	551.8	545.5
1995	427.4	601.6	524.0
1996	706.2	672.3	736.8
1997	1259.4	922.0	880.9
1998	539.3	753.7	691.9
1999	832.2	973.0	759.7
2000	834.5	742.2	817.7
2001	1082.0	1012.3	557.5
2002	553.0	590.0	456.3
2003	724.0	733.4	636.6
mean	791.9	744.6	699.0
standard deviation	209.7	189.8	137.9

Note: - missing data.

Source: ZMD; ZCA station no.2546; Chikuni mission station no.2554; and MACO, Department of Research and Specialist Services.



APPENDIX B 2

ANNUAL RAINFALL, CATTLE MORTALITY AND CATTLE SALES FOR CORRELATION ANALYSIS (1980-2003)

Year	Rainfall (mm)	Cattle mortality	Cattle sales
1980	756.0	1311	12998
1981	826.6	5281	7582
1982	541.0	5063	4156
1983	786.0	4128	11725
1984	578.5	706	12080
1985	809.8	1410	14362
1986	1115.6	1886	13912
1987	608.2	1856	8538
1988	738.6	1010	34861
1989	1069.9	915	36275
1990	629.8	981	40309
1991	207.9	3050	23332
1992	498.8	1691	21681
1993	552.9	985	6737
1994	551.8	564	5461
1995	601.6	1165	7708
1996	672.3	1309	4728
1997	992.0	3945	3066
1998	753.7	1394	1886
1999	973.0	407	2497
2000	742.3	429	2514
2001	1012.3	471	4604
2002	590.0	2469	2782
2003	733.4	237	6564

Source: MACO, Monze District Annual Reports (1980-2003)