

**ASSESSMENT ON THE FACTORS FOR ENVIRONMENTAL  
DEGRADATION IN CHITIPA DISTRICT, SONGWE DRAINAGE BASIN**

**ALEC PHILLIP MALANGA**

**A THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF ENVIRONMENTAL STUDIES OF THE  
OPEN UNIVERSITY OF TANZANIA**

**2018**

**CERTIFICATION**

The undersigned certifies that, they have read and hereby recommends for the Open University of Tanzania a thesis entitled: **“Assessment on the Factors for Environmental Degradation in Chitipa District, Songwe Drainage Basin”** in fulfillment of the requirements for the Degree of Master of Environmental Studies of the Open University of Tanzania

.....

Dr. John Msindai

(Supervisor)

.....

Date

.....

Dr. Emmanuel Patroba Mhache

(Supervisor)

.....

Date

**COPYRIGHT**

No part of this thesis may be reproduced, stored in any retrieval system, or transmitted in any form by any means, electronic, mechanical, photocopying, recording or otherwise without prior written permission of the author or the Open University of Tanzania in that behalf

## DECLARATION

I, **Alec Phillip Malanga**, do hereby declare that this thesis is my own original work for the award of Master of Environmental Studies of the Open University of Tanzania and it has not been submitted to any other institution for any award in other University or Institutions of higher learning.

.....

Signature

.....

Date

**DEDICATION**

I dedicate this thesis to my father Asayile Phillip Malanga (late), to my mother Leya Mulute Mboli, (Nasimwayi) Malanga (late), to my loving wife Agnes Malanga, and to my sons Bupe, Asayile, Tusume and Kenson.

## **ACKNOWLEDGEMENT**

First of all I would like to thank the almighty God for the unflinching love and guidance and for taking me through this work. Dr. John Msindai and Dr. Emmanuel Patroba Mhache, my research supervisors, I thank you very much for all the guidance, support and encouragement you offered to me throughout this work. Special thanks go to Dr. Josephat Saria for moral support. I also thank Benald Kalinga for a wonderful job done in distributing questionnaires and for taking a leading role in focus group discussions. Kenson Phillip Malanga must be appreciated for his encouragement in producing this work. I would like to thank Agnes Malanga for financial support. I also want to thank Prof. Joseph Uta and the entire staff of Mzuzu University library for allowing me to use the University Library.

## **ABSTRACT**

This study examined the linkages between poverty and environmental degradation in Chitipa District. The study focused on cooking and heating energy, farming practices, sources of income, and cultural beliefs. The study showed that there is a strong linkage between poverty and environmental degradation. The study also revealed that cultural beliefs and traditional practices have a bearing both on conservation and destruction of the environment. The research was done in TA Mwabulambya and TA Mwenemisuku and around the Boma in Chitipa District. These sites were chosen as they seemed more affected by environmental degradation. It was therefore expected that research objectives and research questions could be answered by conducting the study in this area. Both secondary and primary data were collected using questionnaires, interviews, focus group discussions and observations. The findings revealed that there is a strong link between poverty and environmental degradation. Evidence has shown that low incomes among the communities, forces both rural and urban residents to use natural resources unsustainably. Unsustainable use of resources is compounded by lack of alternatives means of livelihoods. The findings also revealed that both rural and urban communities are aware of environmental degradation that is taking place in Songwe River Basin. They are also aware of changes in the climate and all the devastating effects. However, they have failed to comply with mitigation mechanisms due to poverty. They attribute their failure to lack of support from the Malawi Government and other stakeholders who they say, do not provide alternatives means of survival. For example they find it difficult to stop using fire wood and charcoal for their cooking and heating. Secondly, firewood and charcoal are sources of income that supplement the farm produce sales. Furthermore,

the study has shown that some cultural practices are useful while others are harmful to the environment. The useful cultural practices included preserved woodlots around grave yards which help in the water cycle. While bad cultural practices included making mats from reeds which are used for burying the dead.



## TABLE OF CONTENTS

<b>CERTIFICATION .....</b>	<b>ii</b>
<b>COPYRIGHT .....</b>	<b>iii</b>
<b>DECLARATION.....</b>	<b>iv</b>
<b>DEDICATION.....</b>	<b>v</b>
<b>ACKNOWLEDGEMENT.....</b>	<b>vi</b>
<b>ABSTRACT .....</b>	<b>vii</b>
<b>LIST OF TABLES .....</b>	<b>xiv</b>
<b>LIST OF FIGURES .....</b>	<b>xv</b>
<b>LIST OF PLATES .....</b>	<b>xvi</b>
<b>LIST OF CHARTS .....</b>	<b>xvii</b>
<b>LIST OF APPENDICES .....</b>	<b>xviii</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>xix</b>
<b>CHAPTER ONE .....</b>	<b>1</b>
<b>INTRODUCTION.....</b>	<b>1</b>
1.1 Background Information .....	1
1.2 Statement of the Problem .....	6
1.3 Objectives of the Study .....	7
1.3.1 General Objective of the Study.....	7
1.3.2 Specific Objectives of the Study .....	7
1.3 Research Questions .....	8
1.4 Significance of the Study.....	8
1.6 Limitations.....	9

CHAPTER TWO .....	10
LITERATURE REVIEW .....	10
2.1 Introduction .....	10
2.2 Definition of Keywords .....	10
2.2.1 Poverty .....	10
2.2.2 Environment .....	11
2.2.3 Environmental Degradation.....	11
2.2.4 Drainage Basin .....	12
2.3 Theoretical Literature Review .....	13
2.4 Empirical Literature Review .....	24
2.5 Review of Policies, Regulations and Bylaws .....	27
2.5.1 Land Tenure .....	27
2.5.2 Environmental Policies.....	28
2.5.3 Regulations and By-Laws.....	29
2.6 Research Gap.....	29
2.7 Conceptual Framework .....	30
<b>CHAPTER THREE .....</b>	<b>32</b>
<b>THE STUDY AREA AND RESEARCH METHODOLOGY .....</b>	<b>32</b>
3.1 Introduction .....	32
3.2 The Study Area.....	32
3.3 Research Design .....	35
3.4 Research Approaches .....	36
3.5 Target Population .....	36
3.6 Sampling Techniques and Sample Size.....	37

3.7	Sources of Data .....	37
3.8	Data Collection Techniques.....	38
3.8.1	Household Heads' Interviews.....	38
3.8.2	Focus Group Discussion.....	39
3.8.3	Direct Observation.....	39
3.9	Data Analysis, Processing and Presentation .....	40
3.10	Validity and Reliability of the Research Instruments .....	40
3.11	Ethical Considerations.....	41
	<b>CHAPTER FOUR.....</b>	<b>43</b>
	<b>RESULTS AND DISCUSSION.....</b>	<b>43</b>
4.1	Introduction .....	43
4.2	Demographic Characteristics.....	43
4.3	Causes of Environmental Degradation .....	50
4.3.1	Cut and Burn Farming Practice .....	50
4.3.2	Shifting Cultivation .....	51
4.4	Socio-Economic Activities.....	57
4.4.3	Construction of Houses .....	64
4.4.4	Tobacco Curing .....	66
4.4.5	Timber Production.....	66
4.4.6	Cattle Rearing and Overgrazing .....	68
4.4.7	Cultral Practices and Beliefs.....	69
4.4.8	Social Economic Activities .....	71
4.4.4	Concern about Environmental Degradation .....	73

<b>CHAPTER FIVE.....</b>	<b>75</b>
<b>DISCUSSIONS .....</b>	<b>75</b>
5.1 Socio-Demographic Characteristics of Respondents.....	75
5.2 Socio-Economic Activities .....	77
5.2.1 Employment .....	79
5.2.1.1 Employment was One of the Socio-Economic Activities in the Study Area .....	79
5.2.2 Business.....	79
5.3.3 Income Level in the Study Area .....	81
5.3.3.1 However, One of the Economic Impacts in the Study Area was Income Level of the People .....	81
5.4 Causes of Environmental Degradation .....	83
5.4.1 Farming system .....	83
5.4.2 Shifting Cultivation .....	83
5.4.3 Cooking and Heating Energy .....	84
5.4.4 Housing Investment.....	87
5.5 Measures of Environmental Degradation .....	88
<b>CHAPTER SIX.....</b>	<b>92</b>
<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>92</b>
6.1 Conclusions .....	92
6.1.1 Conclusion on Link between Socio-Economic Activities and Poverty .....	92
6.1.2 Conclusion on a link between Socio-Economic Activities and Environmental Degradation .....	93

6.2	Recommendations .....	95
<b>REFERENCES</b>	.....	<b>97</b>
<b>APPENDICES</b>	.....	<b>99</b>

## LIST OF TABLES

Table 4.1: Level of Education Attained .....	45
Table 4.2: Number and Distribution (%) of Respondents by Age .....	47
Table 4.3: Distribution of Respondents by Age and Sex .....	49
Table 4.4: Number and Distribution of Crops Grown in the Area.....	53
Table 4.5: Cooking and Heating Energy .....	54
Table 4.6: Chemicals and Fertilizer Application.....	56
Table 4.7: Income from Different Sources.....	58
Table 4.8: Income from Different Sources.....	60
Table 4.9: Number Distribution (%) of Income from Farming by Sex .....	61
Table 4.10: Income Generation Based on Types of Crops Grown .....	62
Table 4.11: Applications of Chemicals and Farm Inputs .....	67
Table 4.12: Number and Distribution of Animals Kept in the Area by Household .....	69
Table 4.13: Knowledge about Environmental Degradation .....	73
Table 5.1: Source of Energy for Cooking and Heating .....	86

## LIST OF FIGURES

Figure 2.1: The Linkages between Poverty and Environmental Degradation with the Intervention.....	30
Figure 3.1: The Songwe Drainage Basin .....	34
Figure 4.1: Level of Education Attained by Sex .....	45

## **LIST OF PLATES**

Plate 4.1: The Cut and Burn System on the Banks of Songwe River .....	51
Plate 4.2: Shifting Cultivation can Cause Environmental Degradation.....	52



## LIST OF CHARTS

Chart 4.1: Income Distribution by Sex .....	61
Chart 4.2: Income Distribution by Crop.....	63
Chart 4.3: Knowledge about Environmental Issues .....	72

**LIST OF APPENDICES**

Appendix I: Interview Questions .....	99
Appendix II: Interview Guide .....	103
Appendix III: Observations Guide .....	104
Appendix IV: Guide for Focus Group Discussion .....	105
Appendix V: List of Figures, Plates, Charts and Tables.....	106

## LIST OF ABBREVIATIONS

ADB	African Development Bank/Asian Development Bank
BCR	Brundtland Commission Report
BOMA	British Overseas Military Administration
CADECOM	Catholic Development Commission
CBO	Community Based Organization
FFA	Food For Asses
FSR	Feasibility Study Report
GOM	Government of Malawi
GDP	Gross Domestic Product
I M F	International Monetary Fund
J C	Junior Certificate
MASAF	Malawi Social Action Fund
MG	Malawi Government
MNSO	Malawi National Statistics Office
MPC	Malawi Population Census
MOA	Ministry of Agriculture
MSCE	Malawi School Certificate of Education
NAPA	National Adaptation Programmes of Action (Malawi)
NGO	Non Governmental Organisation
PHC	Population Housing Census
PRSP	Poverty Reduction Strategy Paper
SAP	Structural Adjustment Program
SCA	Smallholder Coffee Authority

TNEP	Tanzania National Environmental Policy
USA	United States of America
USD	United States Dollar
WB	World Bank
WDB	World Development Bank
WDR	World Development Report
WECD	World Commission on Environment And Development

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background Information**

Songwe drainage basin is shared between the United Republic of Tanzania and the Republic of Malawi. It covers four districts of Ileje and Kyela on the Tanzania side; Karonga and Chitipa on the Malawi side. The main towns are Kyela, Ileje, Chitipa and Karonga. These towns happen to be the district headquarters. However, there are other emerging urban centers such as Kasumulu at the border post and Ilondo north of Kasumulu. The basin covers a total area of 4200 square kilometers with a total population of 320,000 (Feasibility Study Report, 2003). According to 2013 valuation, the GDP per capita income for Tanzania was about 1700 USD. While, the estimated GDP per capita income for Malawi was 900 USD.

According to Swanpoel *et al.* (1998), income of less than two USD per day signifies poverty. However, the World Bank uses household expenditure as its measuring rod of poverty and uses threshold. Where threshold level, indicates the minimum amount needed by an individual to obtain the necessities such as food and shelter within a country. The World Bank also considers people who have a household expenditure below the poverty line as poverty-stricken.

On the other hand, Shah (2005) explains that living on less than a dollar a day is the official measure of poverty. The main source of cooking and heating energy in the Songwe Drainage Basin is fuel wood and charcoal sourced from surrounding forests. As a result forest degradation in the area. Due to forest degradation,

rainwater runoff leaches the soils making them less productive. Severe watershed degradation continues to occur in the tropical regions of Southern Africa.

This has raised interest to harness and manipulate the potential watershed resources for human benefit as populations grow. Songwe River Basin is one of the degrading watersheds that cause biennial flooding among other problems (Munthali *et al.*, 2011). The frequent flooding and changing course of Songwe River prompted governments of Tanzania and Malawi to come up with a joint effort to construct three control dams along the Songwe River (Feasibility Study Report, 2003). Munthali *et al.* (2011) in their document further explains that many river systems in the tropical regions of Africa continue to experience severe and uncontrolled environmental degradation.

Environmental degradation results in enhanced soil erosion in the catchments, thereby causing a range of problems from considerable loss of soil fertility and desertification. In the case of Songwe River Basin the declining watershed resources puts great pressure on the agriculture, land that support livelihood. The intensive cut and burn practice has been identified as the main driver of erosion in the catchment area. The cut and burn agriculture system is usually followed by shifting cultivation where millet and maize are grown. Shifting cultivation is another cause of environmental degradation as it leaves land prone to soil erosion. Why do people engage themselves in activities that degrade the environment? Opportunities for formal employment within and outside the agriculture sector are rather limited in the whole catchment area. Subsistence agriculture production does not afford to employ labourers. Community Based Organisations (CBO) and Non-Governmental

Organizations (NGO's) that could have been providing potential areas for employment are rare in the Drainage Basin (Feasibility Study Report, 2003).

The livelihood of both Tanzanians and Malawians in Songwe Drainage Basin depends on rain for their subsistence farming. Coffee, maize and groundnuts are main cash crops in the basin; while, rice, millet and cassava are the food crops. No commercial farming is practiced in the Basin (Feasibility Study Report, 2003).

Due to sole dependence on agriculture and farming for livelihood; land is the most important resource for the people in the catchment area especially in the upper and middle sections. Songwe Drainage Basin is characterized by shifting cultivation. This farming practice is used for the growth of millet. Communities along the basin especially the upper part believe that millet gives better yield if grown on burnt up piece of land locally known as "*Fikwebwe*".

Poverty contributes to environmental degradation in the Songwe drainage Basin. It is stated that as people become poorer they destroy the resources faster due to lack of alternative means of survival (UK Essays, 2013). Poverty along the Songwe Drainage Basin has for long time been an endemic economic problem. Implicitly, development efforts and economic policies that have been initiated in the area, have not adequately addressed the issue. They have failed to consider the environment (Feasibility Study Report, 2003). Despite efforts to address poverty, environmental degradation continues to rise in the basin. Elliot (1994 ) cited by Swanpoel, De Boer (1998 ) states that, the severity of poverty in the developing world, forces people to abuse and over. exploit the very natural resources they

depend on for their survival. Similarly, Songwe drainage basin in recent years have experienced acute deforestation and land degradation.

In order to get best health services and to pay school fees for their children, rural communities along the basin, resort to charcoal making. Charcoal is sold to urban residents where there is high demand for it. This study has established that, there is very little usage of charcoal in rural areas of the basin. However in isolated cases charcoal is used in local foundries, “*mafulilo*” where scrap metals are shaped into farm implements. This practice contributes to resource depletion.

Unfortunately, unsustainable resource consumption eventually breeds perpetual poverty (UK Essays, 2013). However, both Government of Tanzania and Government of Malawi have instituted measures to control the use of charcoal. Unfortunately, the control measures are not effective since charcoal making continues in the area. Another harmful practice is shifting cultivation. The basin, especially the upper part on the Malawi side is characterized by shifting cultivation. Communities in the catchment cut young trees, pull them together and leave them to dry.

Once the trees dry up, they are set on fire. This becomes a suitable piece of land for millet growing. After growing millet for one season or two, the place is abandoned and another place is identified. This kind of practice is very destructive as it takes a number of years for new vegetation to grow. This practice leads to environmental degradation resulting in poor rainfall patterns and eventually low harvests are experienced.



For a long time, Songwe Drainage Basin has been experiencing massive livestock encroachment from areas such as Shinyanga, Arusha and central regions of Tanzania in search of water and grass, since the catchment area is endowed with several rivers and rich soils. Owning cattle in this area is a symbol of wealth. Cattle are used for paying “lobola”, the bride price. It is also used for pulling ploughs and ox carts on the farms. Cattle dung provides manure and in extreme shortage of fuel wood it is used for cooking and heating. This practice encourages many families to own cattle. As a result, the area has a lot of cattle and other livestock. Most of the cattle are kept on free range. Consequently, environmental degradation is on the increase that results in poor harvests.

Due to extractive industries, infrastructure development and fuel wood consumption, ecosystems upon which the survival economy depends, become degraded. As a result, rural populations are driven into poverty as they compete for scarce natural resources. Similarly, due to growing population within the Songwe drainage basin, there is high demand for fuel wood and other forest resources used in people’s livelihood. Women and children have to spend on average four to six hours per day searching for fuel wood and four to six hours per week drawing and carrying water. It is believed that such conditions encourage high fertility rates because in the long run children help their families to gather needed resources.

However, population growth in the survival economy only reinforces a vicious cycle of resource depletion and poverty (Russo, 2009). Nevertheless, there is a rising trend in the economic literature that disputes the conventional theory that links poverty to population growth. It argues that simple generalizations of this multi-

dimensional problem are erroneous and that a more complex set of variables are in play (Leach and Mearns, 1995 cited by Duraiappah (1996). Studies that dispute the conventional theory that links population growth to poverty suggest that advancement in technology would sort the poverty issue despite population growth. In conclusion, it must be noted that Songwe Drainage Basin is a victim of environmental degradation arising from human activities such as shifting cultivation, wood fuels, charcoal making, overgrazing, timber making and construction materials. It must also be noted that all these human activities are very much linked to poverty, which is prevalent in the area.

## **1.2 Statement of the Problem**

The Songwe Drainage Basin has for some time now suffered from various environmental problems such as increasingly devastating floods often believed to be resulting from large scale deforestation. Songwe River serving as a lifeline to the rural populations on its banks is experiencing declining watershed resources that put great pressure on the agricultural land that support households. Survival economy reinforces a vicious cycle of resource depletion and poverty (Russo, 2009). It is important that in dealing with the poverty- environmental degradation nexus, poverty reduction must take a center stage.

Over the years, Songwe River Basin has been adversely affected by unsustainable human practices such as deforestation, bush burning and shifting cultivation in the catchment area and riverbanks in the upper reaches. Such anthropogenic activities have been the major causes of environmental degradation in the drainage basin. The intensified cut and burn agricultural practice in the catchment area, is considered the

main driver of soil erosion. Being part of Lake Malawi/Nyasa ecosystems, degradation of the Songwe River catchment, poses a great risk to the ecosystem since the Songwe River delivers the highest sediment load into the lake. The delivered sediments into the lake, result in great risk of extinction, of the aquatic life (Munthali *et al.* 2010).

As the river continuously meanders in the lower sub-basin, it changes its course in the process. This unstable flow of the river causes frequent flood events that cause great danger to life and infrastructure and a shifting river boundary problem to the neighboring countries of Tanzania and Malawi. It is estimated that floods inundate over 9000 hectares of fertile land leaving the inhabitants without food (Munthali *et al.* 2010). This study is therefore, trying to mitigate environmental problem found in the area through community awareness and reduction of anthropogenic activities considered as main causers of environmental degradation. The study is therefore trying to narrow the gap that was not addressed in the previous studies.

### **1.3 Objectives of the Study**

#### **1.3.1 General Objective of the Study**

The general objective of this study was to asses **factors for** environmental degradation in the Songwe Drainage Basin.

#### **1.3.2 Specific Objectives of the Study**

- (i) To examine the socio-economic activities of the people in the Songwe Drainage Basin.
- (ii) To identify causes of environmental degradation in Songwe Drainage Basin.

- (iii) To strategize measures taken for combating environmental degradation in the Songwe drainage basin.

### **1.3 Research Questions**

- (i) Which economic activities prevalent in the study area
- (ii) What are the causes of environmental degradation in Songwe Drainage Basin?
- (iii) What are the measures to address environmental degradation in the Songwe Drainage Basin?

### **1.4 Significance of the Study**

This study is worth undertaking in five aspects. First, the study findings might be useful in mitigating environmental degradation, which is on the rise in the area of study. This could be achieved when people are aware of the causes. Second, study findings might be useful to the government of Malawi to enable it change or adjust its programs concerning poverty alleviation in rural communities through the inclusion of rural citizens in a participatory manner. When communities are involved in actions that aimed at implementing environmentally friendly programmes, they will develop a sense of ownership.

Fourth, study findings might be useful to the government Malawi when they initiate conservation programmes around the drainage basin. The findings will act as eye opener to the concerned authorities to know exactly what might be required for the communities. Fifth, research findings might bring awareness to rural communities around the basin to take an active role in supporting government's efforts in natural resource conservation programmes and to help them come up with

alternative income generating activities. In addition, the study will play a significant role to the economy of the Songwe drainage basin. It will attempt to explain the linkages between poverty and the environment in the catchment area.

The study will also examine the extent of poverty and environmental degradation along the Songwe basin. It will explore the impact of policies that have been designed to alleviate poverty among the communities in the basin. Above all, the study will contribute to the knowledge gap by trying to establish the causal relationship between poverty and environmental problems in the Songwe drainage basin. Finally findings in this study will go a long way in influencing policy formulation and decision making concerning the drainage basin.

## **1.6 Limitations**

Due to bad terrain in some places, in the area selected for this study, the researcher was not able to cover the whole area within the time schedule. Another limitation was the anthropogenic activities. Most of the respondents were busy doing their various activities during greater part of the day. As a result the researcher had to visit the same place twice or three times in some cases. This was time consuming and delayed the exercise to finish in good time. Due to high illiteracy rate, some respondents were not able to read the questionnaires on their own, so they had to be guided. This too delayed the process.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter covers views of different authors on linkages between population, poverty and environmental degradation. It provides an analytical overview of existing research work and academic approaches to the inter linkages of population, poverty and environment. It is asserted that poverty causes environmental degradation and that environmental degradation leads to poverty. The chapter also covers definitions of keywords, issues of policies, regulations, and bylaws associated with conservation of the environment.

#### **2.2 Definition of Keywords**

##### **2.2.1 Poverty**

Poverty is the state or condition of having little or no money, goods or means of support. It is an ill being manifested by lack of basic necessities such as proper housing, decent food, safe water, medical care and education in one's livelihood (Swanpoel and De Boer, 1998; Shah, 2005). Swanpoel *et al.* (1998) further describes poverty as a relative term because it can either describe the situation of an individual, a family, a community or society in comparison with others. For example a country like South Africa which might be considered rich in the African context will be deemed poor when compared to United States of America (USA). However, Enger and Smith (2007) look at poverty, as high birthrates, poor health and lack of education as seemingly interrelated. Since poor people can neither afford nor properly follow birth control instructions.

They state that poor people need to obtain income in many ways such as withdrawing children from school and deploying them on the farm activities in order to maximize income. Enger *et al.* (2007) further state that a person who is worrying about his next meal is not going to listen to lectures on protecting the environment. Poverty therefore describes a range of circumstances associated with needs, hardship and lack of resources. United States Dollar could be used as a yardstick to measure poverty. Families with income of less than one US Dollar per day is regarded as poor (Swanpoel *et al.*, 1998).

### **2.2.2 Environment**

Rasmussen *et al.* (1992) defines environment as living and nonliving organism's surroundings including; light, temperature, air, soil, water and other organisms. On the other hand, Miller (2007) defines environment as all external conditions and factors, living and nonliving, (chemicals and energy), that affect any living organism or other specified system. On the other hand, environment refers to all of the biotic and abiotic factors that act on an organism, population or ecological community and in a way influence its survival and development.

### **2.2.3 Environmental Degradation**

Environmental degradation is defined as depletion or destruction of a potentially renewable resource such as soil, grassland, forest or wildlife that is used faster than it is naturally replenished. If such use continues, the resource becomes nonrenewable or extinct (Miller, 2007). Environmental degradation is the deterioration in environmental quality from ambient concentrations of pollutants and other activities and processes such as improper land use and natural disasters.

Environmental degradation also refers to the changes of quality of natural resources caused directly or indirectly by human activities such as cutting down trees for fuel wood, and charcoal, emitting greenhouse gases, and practicing agricultural methods that will create soil erosion or any such activities that will destroy ecosystems and other means of life.

Environmental degradation is a serious issue; and over the past decades the effects have been felt across the globe. Human activities are resulting in mass species extinction rates higher than ever before. For example, Nepal and Bangladesh have suffered from various environmental problems such as increasingly devastating floods, often associated with large scale deforestation. Around the world, forests face increased pressures from timber companies, agricultural businesses and local populations that use forest resources; such as fuel wood, charcoal and building materials (Shah, 2005).

#### **2.2.4 Drainage Basin**

A drainage basin is a region of land where water from rain or snow melt or drain downhill into a body of water such as a river, lake, dam, estuary, wetland, sea or ocean Miller (2007). It includes both the streams and rivers that convey the water as well as the land surfaces from which water drains into those channels. It is an area of land where precipitation drains downhill into a body of water. It includes the main stream and tributaries, as well as the land surfaces the water drains from. Drainage basin are also called watersheds or catchments (<http://wordnetweb.princeton.edu/webwn>). According to Daniel and Keller (2005), a drainage basin, is the land area that contributes water to a particular stream system.



### 2.3 Theoretical Literature Review

The severity of poverty in the developing world is forcing people to abuse and over-exploit the resources they depend on for their survival (Elliot, 1994). Holding a similar view, Enger and Smith (2007), observed that in order to pay for development projects, many economically poorer nations are forced to borrow money from banks in the developed world and that the burden of external debt becomes so great that many developing nations see little option but to overexploit their natural resource base. Enger *et al.* (2007) further observed that, many countries under pressure from their debt crisis feel forced to exploit their natural resources, rather than manage them sustainably. Elliot (1994) cited by Swanpoel *et al.* (1998) who further states that due to governments' pricing policies which determine that farmer's income from the cash crops will be much higher than for food crops. Such decisions tend to motivate farmers to concentrate on cash crops.

This move encourages farmers to abuse and over-exploit land, which eventually degrade the environment. On the other hand, Swanpoel *et al.* (1998) is of the view that poor people abuse land due to the problem of inequitable access to land. They further explain that when people have access to small piece of marginal land only, they cannot afford to let part of the land lie fallow for some time to recover its strength naturally and when they do not have enough money to buy inputs like fertilizer to improve the quality of the soil, the soil will deteriorate rapidly.

In Malawi for example, more than 90% of the people, mainly comprising resource-poor rural communities are predominantly engaged in subsistence rain-fed agriculture, 60% of who are food insecure on a year round basis. This situation have been

exacerbated by increasing poverty and population pressures (NAPA, 2006). The document further explains that the situation has been compounded by rapid environmental degradation due to agriculture expansion to marginal lands and deforestation. However, contrary to having access to a small piece of marginal land, it is also true that when the rural poor communities are exposed to plenty natural resources, they tend to be careless and start over-exploiting the resources. They tend to view natural resources as being limitless.

In this regard, Todaro (1997) explained that the existence of land in excess of immediate requirements permits a general practice of shifting cultivation. This situation has been made worse by the anthropocentric or human centered theory. Anthropocentrism is the view that all environmental responsibility is derived from human interests alone. The theory assumes that only human beings are morally significant organisms that have a direct moral standing above all creation (Enger *et al.*, 2007). This kind of approach has a significant negative impact on the environment as well as on people's livelihoods.

For example, India is currently facing critical resource and environmental problems. It is observed that about half of India's cropland is degraded as a result of soil erosion, water logging, salinization, overgrazing and deforestation. This environmental degradation is attributed to high population growth which is exacerbated by most poor couples who still believe that they need many children, especially male children, to do work and care for them in old age. As a result, about 40% of its people and more than half of its children suffer from malnutrition (Miller, 2007).

Lack of proper family planning programs in India and low status of women in the society, extreme poverty and lack of administrative and financial support by the government, have made the situation worse resulting in the country's increased ecological footprint that has negatively impacted on both the country's and earth's natural capital. In efforts to conserve natural resources, rural communities are faced with the challenge of balancing between income generation and sustainable use of natural resources. No explanation of soil erosion and land degradation are possible at a number of levels (O'Riordan, 2000).

For example, one would ask, why should farmers erode their soil when many of them know very well that their practices jeopardize their future by destroying the environment around them? Part of the answer lies in the decision-making and prioritizing income opportunities of different households. On the other hand, it is clear that poverty can force people to make short term choices that degrade the environment, like cutting down nearby trees for firewood and other uses despite the likelihood of future shortage of rainfall and soil erosion resulting from land exposure (Russo, 2008).

One of the factors that affect the environment and conservation efforts is the rural livelihood. In rural areas life is solely depended on natural resources. As a result when such natural resources are not used sustainably, the environment is affected. The "reproduction squeeze" as described by Blaikie, (1989) cited by O'Riordan (2000) gives a good example of how rural peasantry may be caught between maintaining current livelihood and looking after conservation works. Livelihood will usually win. It is further stated that basically, a small farmer

must produce and purchase commodities for production e.g. hand hoe for tilling land or purchase commodities like fertilizer for crops and batteries for the radio.

Poverty is a major threat to human health and the environment. As a result, the world's poorest people suffer the most from pollution and environmental degradation (Miller, 2007). Miller further observes that poverty, the inability to meet one's basic economic needs is concentrated mostly in the southern hemisphere where many of the world's poor do not have access to the basic necessities for a hearth and productive life. Many are homeless and their daily lives are focused on getting enough food, water and fuel for cooking and heating to survive.

Miller (2007) continues to explain that desperate for land to grow enough food, many of the world's poor people deplete and degrade forests, soil, grasslands and wildlife for short term survival and they do not have the luxury of worrying about long term environmental quality or sustainability. In the same book, it is stated that poverty also affects population growth. Poor people often have many children as a form of economic security. Their children help them gather fuel mostly wood and animal dung, haul drinking water, tend crops and livestock, work and beg, in streets.

The children also help their parents survive in their old age before they die. However, some experts disagree about how serious our population and environmental problems are and what we should do about them. Some suggest that human ingenuity and technological advances will allow us to clean up pollution to acceptable levels and find substitutes for any scarce resources and keep expanding the earth's ability to support more humans (Miller, 2007). Critics that hold the view that there is

no justification on the claims that population has a bearing on environmental degradation, suggest that to deal with population problem, countries must advance technologically. New technologies will enable nations to come up with innovations and discoveries that will support large populations from what is currently perceived as limited resources. It is also urged that in developing countries population size and the resulting degradation of renewable resources tend to be the key factors in total environmental impact.

However, in such developing countries resource use per person is low. Whereas, in developed countries high rates of resource use per person (affluence) and the resulting high levels of pollution and environmental degradation per person are usually the key factors determining overall environmental impact and a country's global ecological footprint and its ecological footprint per person (Miller, 2007).

On the other hand, there is an implicit view correlating poverty to environmental damage (Russo, 2008). The book states that as the developing world seeks to lift itself out of poverty, it will not achieve its goal if it replicates industrialized countries inefficient use of resources. This implies that to some extent developed countries used resources inefficiently that led to environmental degradation and therefore developing countries must not take the same path. Poverty and third world debt has been shown to result in resource stripping just to survive or pay off debts. For example, Nepal and Bangladesh have suffered from various environmental problems such as increasingly devastating floods, often believed to be resulting from large-scale deforestation.

Forests around the world face increased pressure from timber companies, agriculture business and local population that use forest resources (Shah, 2005). It is further stated that, rainforests are often cleared to make way for grazing animals to be slaughtered for unhealthy fast food meat consumption. While prime land and the surrounding environment is often degraded when producing cash crops for the wealthier parts of the world (Richard and Robins) captured by Shiva (2000) in her article the “Stolen Harvest”, Shiva explains that excessive third world debt burden has meant that it has been harder to prioritize on sustainable development.

Unfair debt imposed on the third world for decades by the global institutions such as the International Monetary Fund (IMF) and World Bank (WB) through their harsh Structural Adjustments Programs (SAPs) have opened up of economics rapidly in socially, politically environmentally and economically destructive ways, while requiring a prioritization on debt payments. They encouraged concentration on producing just few cash crops and other commodities for export by practicing the very environmentally damaging “industrial agriculture” which reduces biodiversity and requires costly inputs such as environmentally damaging pesticides and fertilizer, to make up for the loss of free service a diverse farm ecosystem would provide.

The link between poverty and environment has often been mentioned in the “sustainable development” debate and is seldom systematically explored (Lele, 1991) cited by Nayak, (2004) in the paper presented to the annual conference of NEEA, held at Dibrugarh Assam in January, 2004. Environmental degradation and poverty alleviation are urgent global issues that have a lot in common, but are

often treated separately. However, it must be noted that, human activities are resulting in mass species extinction rates higher than ever before, currently approaching 1000 times the normal rate.

Human induced climate change is threatening an even bleaker future (Shah, 2005). The literature that treats the link usually focuses on the “vicious circle” between poverty and environmental degradation; the circle is Malthusian in inspiration where farmers pushed by population increase and poverty, extend cropping into fragile marginal lands and degrade them.

As a result the yield is reduced and this further impoverishes farmers (Dasgupta and Maler, 1994; Pearce and Warford, 1993 and Mink, 1993 cited by Nayak (2004). A new dimension to the link between poverty and environmental degradation was brought out in 1995 when Reardon and Vosti introduced the concept of investment poverty and related the same to other measures of poverty (Reardon *et al.*, 1995). Finally they concluded that the links between poverty and environment in a given setting depend on the level, distribution and type of poverty and environmental problems.

A major work was undertaken to study the relationship among population, poverty and environmental degradation in China, (Rozelle *et al.*, 1997). The authors examined the impact that each had on the China’s land, water, forests and pasture resources. They found the government policy to be ineffective in controlling rural resource degradation primarily because of its limited resource and poorly trained personnel. According to the report of government of China Ministry of Agriculture

(MoA), rapidly expanding townships and village enterprise sector have been the major sources of water pollution in China, Government of China, (1991). Rozelle *et al.*, (1997 b) in their research paper, further show econometric evidence that impact of erosion and salinization is systematically more serious in poorer and more densely populated areas. Housing investment as a major user of wood products has been rapidly growing and causing wide spread deforestation World Bank Report (1992).

According to the “Brundtland Report”, poverty is a major cause and effect of global environmental problems (World Commission on Environmental Development, 1987). The poor are the victims of environmental degradation and too are the agents, and perpetrators of the degradation. They are basically short run maximizers as they try to meet the needs of the present at the cost of the future. Poverty and hunger often force them to destroy their immediate environment for their survival. They cut down forests, their livestock overgraze grasslands, they overuse marginal lands and they crowd into congested cities in growing numbers. Poverty is therefore one of the greatest threats to the environment (UNDP, 1990).

The above discussion on various studies conducted worldwide, reveal that there is a two way linkage between poverty and environmental degradation. Degradation of the environment caused either by the poor or the rich has both direct and indirect impacts on the cost of production but also on the productivity of crops and thus on the income of the people. The poor get more affected than the rich and become poorer due to environmental degradation manifested through destruction of forests for fuel wood, timber, jhum cultivation, degradation of land, water through the use of



chemical fertilizers, pesticides etc. in modern farming and pollution of air due to consumption of biomass fuel.

Thus, a vicious link is established between poverty and environmental degradation. Each becomes the cause and effect of the other. Many people have been forced into poverty due to politics and economics such as concentrated land rights, pressure from industry to exploit the environment in ways that destroy diversity and affect local populations etc. However, the poor often have a lot of knowledge about their environment and are often sustainers and efficient users of it as they recognize their link to it for their survival (Shiva (2000) cited by Shah (2005)).

In the report of the World Commission on Environment and Development (WECD) it is stated that, “In their quest for food security, the rural poor have sometimes little choice but to overuse the limited resources available to them”. The resulting environmental degradation imposes further constraints on their livelihood in what has been called a “downward spiral” or “vicious circle”. They are often forced to make trade-offs between immediate household food requirements and environmental sustainability both in production and consumption.

Their negligible man-made capital assets, ill-defined or non-existent property rights, limited access to financial services and other markets, inadequate safety nets in time of stress or disaster and lack of participation in decision-making can result in their adopting “short time horizons” which favour immediate imperatives over long term objectives. The idea of a circular relationship between environment and poverty is now widely seen as too simplistic, ignoring the complex circumstances in which the poor find themselves. Broad (1994), Prakash (1997), Ambler (1999), Scherr,

(2000) and Broad *et al.* (1994) suggests that the causal roots of environmental degradation lie in institutional and policy issues rather than in poverty itself.

Broad (1994) goes on and concludes that the relationship between poverty and environment is mediated by institutional, socio economic and cultural factors. Poverty is viewed as one of the primary causes of environmental degradation. Poor people cannot in their present state practice sustainable development since they are short term maximizers. It therefore means that if much of the environmental problem is poverty, then eliminating poverty through economic growth, becomes key to saving the environment (Broad, 1994).

Despite the recognition that the poor are not the only culprits in as far as environmental degradation is concerned, there is a lot of controversy surrounding the link between poverty and environmental degradation. Two schools of thought have emerged. One is the predominant school of thought that argues that poverty is a major cause of environmental degradation and that if policy makers want to address the environmental issues, they must first address the poverty issues.

In his paper, Duraiappah (1996) has highlighted a formal structure for analyzing the complex web of factors used to review the existing literature on the links between poverty and the degradation of natural resource sectors that include; forest, land, water and air (indoor and outdoor pollution). Duraiappah (1996) further states that there is a general consensus that poverty is a major cause of environmental degradation. Duraiappah cites the Bruntland Commission Report (BCR), which incidentally has been accepted as the blue print for environmental conservation,

where it was explicitly stated that, poverty is a major cause of environmental problems and that amelioration of poverty is a necessary and central condition of any effective programmes addressing the environment.

Following similar lines Jalal (1993), the Asian Development Bank's (ADB) chief of the environment department cited by (Duraiappah,1996) says that, it is generally accepted that environmental degradation, rapid population growth and stagnant production are closely linked with the fast spread of acute poverty in many countries of Asia. In a similar manner, the World Bank (WB) joined the consensus when in its 1992 World Development Report (WDR) explicitly stated that poor families who have to meet their short term needs, mine the natural capital by excessive cutting of trees for firewood and failure to replace soil nutrients (World Bank, 1992 cited by Duraiappah,1996).

The literature review in this study, is strongly linked to Human Impact on environment (I) = Population Affluence and Technology (PAT) model equation which draws its theory from the debate conducted by Ehrlich *et al.* (1970s). I=PAT model looks at population, affluence and technology as factors that cause human impact on the environment. The I=PAT equation has however been criticized as being too simplistic by arguing that population, affluence and technology are not independent of each other. Despite the short falls, the I=PAT equation has however, made a contribution to understanding the multiple causes of impact and continues to be developed as a method of improving our understanding of these issues. This model is therefore quite relevant to this study since it gives some insight to the linkages regarding the factors of the equation.

## 2.4 Empirical Literature Review

Empirical studies in many countries have revealed that the poverty-environment argument has recently become more sophisticated. The links between poverty and environmental change are mediated by diverse set of factors that affect the decisions that the poor people make. For example as the tenure system in China provides individuals incentives to expand their herds and increase their household profit, these individuals tend to abuse the land in the short run due to factors related to the private use of collective resources (Wu, 1988 cited by Rozelle *et al.* 1997). However, degradation of environment caused either by the poor or the rich has both direct and indirect impacts not only on the cost of production but also on the productivity of crops and thus on the income of people (Nayak, 2004). As a result, environmental effects on the health and livelihood of the poor are directly or indirectly being felt.

Human activities in many parts of the world are resulting in mass species extinction rates higher than ever before. For example Nepal and Bangladesh suffer from various environmental problems such as increasingly devastating floods, often associated with large scale deforestation Shah, (2005). Around the world, forests face increased pressures from timber companies, agricultural businesses and local populations that use forest resources, such as fuel wood charcoal and building materials (Shah, 2005).

Songwe River Basin is one of those areas where poverty-environmental linkages have not been taken into account in planning and implementation of socio-economic programs. In view of such shortfalls, environmental degradation has continued to occur. Some studies reveal that due to deforestation, agricultural expansion and

overgrazing of livestock, there has been widespread destruction of grasslands causing environmental problems (Lieu *et al* 1991 cited by Nayak, 2004). Nayak (2004) further observes that soil erosion is also taking place due to deforestation and overgrazing. Mountainous lands, hilly regions and plateaus are most vulnerable to soil erosion. Along the Songwe Drain Basin grassland is affected by three important elements; deforestation, agricultural expansion and overgrazing of livestock (Feasibility Study Report, 2003).

Liu *et al.* (1991) cited by Huang *et al.* (1997) observed that agricultural expansion on to grasslands create environmental problems when winds and heavy rains cause exposed soil to be lost from recently ploughed or harvested land. Tang and Zhang (1990) cited by Rozelle *et al.* (1997) demonstrated that intensified agricultural production systems in heavily populated watershed areas can have adverse environmental consequences. It has been observed that forests, especially tropical moist forests, serve as important water catchment area and therefore loss of forest cover disrupts the hydrological cycle (Duraiappah, 1996).

Holding a similar view, Salati (1995) cited by Duraiappah (1996) estimates that as much as 75% of yearly rainfall in the Amazon Basin is returned from the forest to the atmosphere and loss of this cover could reduce future rainfall, which could eventually result in poverty. Songwe Drainage Basin is one such area that has lost its forest cover due to human activities. Due to loss of its natural protective covering, Songwe Drainage Basin has in recent years experienced erratic rainfall patterns that have resulted in poor harvests. Lack of techniques of erosion control, such as terracing can lead to significant long term soil and fertility losses and strong

economic consequences. World Bank (1992) cited by Roselle *et al.* 1997). Tang and Zhang (1990) cited by (Rozelle *et al.* 1997) explain that intensified agricultural production systems in heavily populated watershed areas can have adverse environmental consequences as has been the case in China. When farmers are pushed by population increase and poverty, extend cropping onto fragile marginal lands and degrade them. Once the hillside has its natural protective covering removed, unless properly designed and carefully managed, high rainfall levels cause further breakdown of the poor soil base. As a result, the yield is reduced and this further impoverishes farmers (Dasgupta and Maler 1994, Pearce and Warford 1993 and Mink (1993)) cited by Rozelle *et al.*, (1997).

Many river systems in the tropical regions of Africa continue to experience severe and uncontrolled environmental degradation. For example, human activities (such as deforestation, bush burning and unsustainable cultivation) in the upper parts of Songwe River are causing excessive flooding of the river and other problems (Feasibility Study Report volume1). This has resulted in enhanced soil erosion in the catchments, thereby causing a range of problems from considerable loss of soil fertility and eventual desertification. In the case of Songwe River, the declining watershed resources have put great pressure on the agricultural land to support livelihoods. Being part of the Lake Malawi /Nyasa ecosystem, degradation of the Songwe River catchment poses a great risk to the ecosystem as it reportedly delivers the highest sediment load to the Lake.

The river continuously meanders in the lower sub-basin changing course in the process. This unstable flow of the river causes frequent flood events that cause great

danger to life and infrastructure and a shifting river boundary problem to the neighboring countries of Malawi and Tanzania. A bilateral and multi-sector collaborative effort with the context of resources conservation and the fight against poverty, aims to assist the local people to improve their livelihoods while securing natural resource conservation. Disturbances in vegetation cover due to agriculture, timber and charcoal harvest, construction and others leave soils vulnerable to erosion (Sustainability Report, 2011). Urbanization causes significant environmental impacts on the basins and streams. This is due to covering of land with pavements and buildings that will not allow water infiltration. Instead, this will promote runs off through artificial surfaces to drainage systems and then to streams (Botkin and Keller, 2005).

## **2.5 Review of Policies, Regulations and Bylaws**

### **2.5.1 Land Tenure**

In Malawi, there is the Malawi Land Policy of 2001 which allows all land belonging to Traditional Authorities to be registered and protected by law against arbitrary conversion to public land. Under the customary law, the Traditional Chief has a mandate to allocate land to his subjects basically men as household heads under patriarch system. In Karonga, at household level, the household head is responsible for the allocation of land to other family members.

However, in Tanzania the president is the custodian of the National Land. The Tanzanian National Land Act No.4 and Village Land Act No.5 of 1999, gives the village government the mandate to oversee and to manage the village land. The village Act challenges the customary law and gives room to women to access and own land.

In Kyela for example, the village government is responsible for land distribution (Feasibility Study Report, 2003).

### **2.5.2 Environmental Policies**

The Malawi National Environmental Policy of 2004 advocates for environmental education and public awareness. It emphasizes on public and political awareness and understanding of the need for sustained environmental protection, conservation and management. The policy calls for private sector and community participation to mobilize initiatives and resources in the private sector, NGOs and CBOs in order to achieve sustainable environmental management. The policy seeks to involve local communities in environmental planning and action at all levels and to empower them to protect, conserve and sustainably utilize the Nations natural resources.

On the other hand, the Tanzania National Environmental Policy (TNEP) of (1997) has laid down a number of environmental objectives; to ensure sustainability, security and equitable use of resources for meeting the basic need of the present and future generations without degrading the environment. It seeks to prevent and control degradation of land, water, vegetation and air which constitute life support systems. The policy promotes conservation and enhancement of natural and man made heritage that include the biological diversity of unique ecosystems of Tanzania. It also seeks to improve the conditions and productivity of degraded areas including urban and rural settlements in order that all Tanzanians may live in safe healthful productive and pleasing surroundings. It also seeks to raise awareness and understanding of the essential linkages between environment and development.



### **2.5.3 Regulations and By-Laws**

In 1991, Karonga district authorities made a regulation against bush-fires which they felt contribute to sediment load in the rivers (Feasibility Study Report, 2003). On the Tanzanian side efforts to control the movement of wood products such as charcoal, firewood and timber have been instituted. This is evidenced by forest control posts at strategic points. However, the illegally exploited charcoal from the surrounding Ngana hills on the Malawi side finds its way into Tanzania border town of Kasumulu and other surrounding villages (Feasibility Study Report, 2003).

## **2.6 Research Gap**

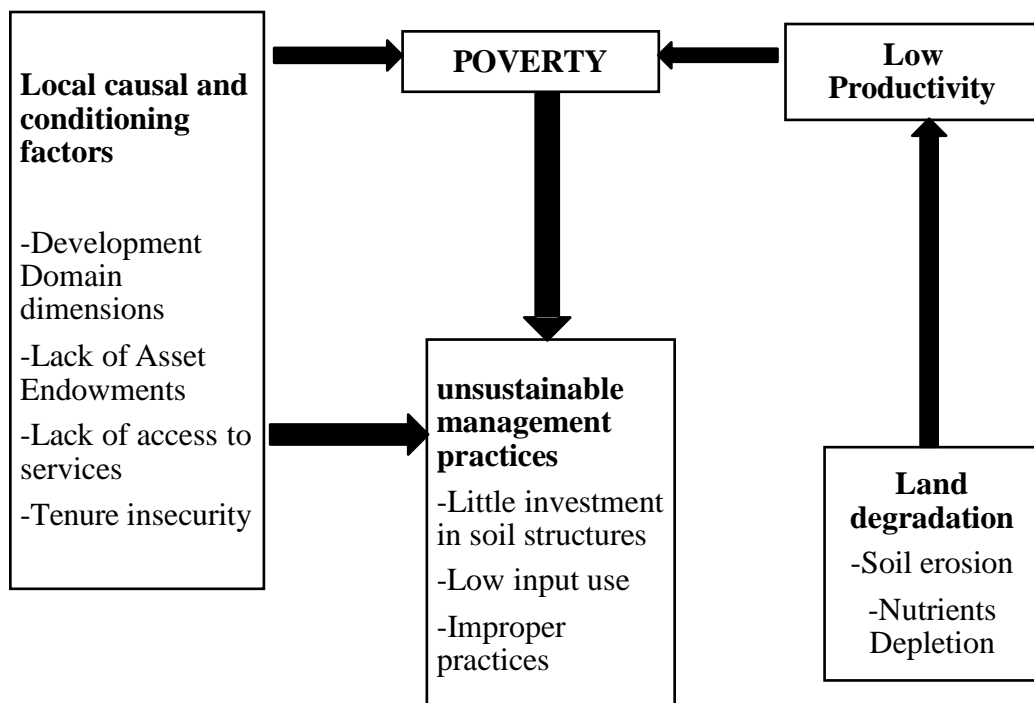
This study tried to establish causal relationship between poverty and environmental degradation in the Songwe Drainage Basin in Chitipa District. Both countries within the drainage basin have National Development Strategies that are linked with their respective Poverty Reduction Strategy Papers (PRSP). However, such strategies are yet to be implemented.

Therefore this calls for contribution to this knowledge gap in order to find out whether this could have contributed to causes of environmental degradation problems. Dams and reservoirs that were meant to be constructed on the upper part of the Songwe River with a view to control floods and to generate electricity that would provide an alternative source of cooking and heating energy have not been affected. However, the river floods have continued to degrade the environment. This is a research gap which require establishing strategies to control floods and to call for proper land management practices.

## 2.7 Conceptual Framework

The conceptual framework illustrated on Figure 2.1 on the next page, is built around four blocks of variables. These four blocks are unsustainable land management practices, land degradation, low productivity and poverty. When land is poorly managed results to low crop productivity. Low crop production leads to poverty. The general understanding of this concept is that development domain dimensions, asset endowments and access to services, are critical local causal and conditioning factors affecting low income and unsustainable land management strategies.

The linkages between poverty and environmental degradation, with the intervention



**Figure 2.1: The Linkages between Poverty and Environmental Degradation, with the Intervention**

Source: Alemu *et al.*, 2007)

There are two interlinked process, which constitute the conceptual framework. One is poverty which affect environmental conservation while the other is environment degraded which affect the poor. However, the conceptual framework draws principally from the theories of technical and institutional induced innovation arguing that access to markets, agricultural potential and asset endowments affect farmers decisions to use sustainable land management practices (Boserup, 1965; Havami and Rutan, 1985 cited by Alemu *et al.*, 2007). This means that poverty leads to land degradation through little or no investment in soil structures, low input use and improper land management practices.

On the other hand unsustainable land management practices, lead to poverty through low productivity and little food availability which in turn result in reduced capacity of the soils to sustain crops (Alemu *et al.*, 2007). The conceptual framework further tries to simplify the very complicated set of interactions on local causal and conditioning factors, poverty and land degradation, farmers' responses and livelihood outcomes.

The assumption is that local causal and conditioning factors, affect poverty and land degradation directly. It is further argued that the assets a household possesses dictate the household and village assets. These are conditioning factors influencing both the link between types of poverty and behavior and the link between behavior and natural resources (Alemu *et al.*, 2007).

## **CHAPTER THREE**

### **THE STUDY AREA AND RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents materials and methods that were used in conducting this research. It covers the study area, research design, target population, sample size, data collection methods and data analysis.

#### **3.2 The Study Area**

Songwe River Basin is shared between the United Republic of Tanzania and the Republic of Malawi. Songwe River forms the physical boundary between the two countries. It consists of three physiographic zones; the plateau zone. This part contains mountains, headwaters and major tributaries. Escarpment is found in the middle zone. It is characterized by mountains and numerous tributaries. The tributaries are at the foot of the escarpment. This zone stretches a distance of about 20 to 30 kms (Feasibility Study Report, 2003). Lower Basin zone begins from the foothills and extends to lake Malawi/Nyasa which is about 474 meters above mean sea level.

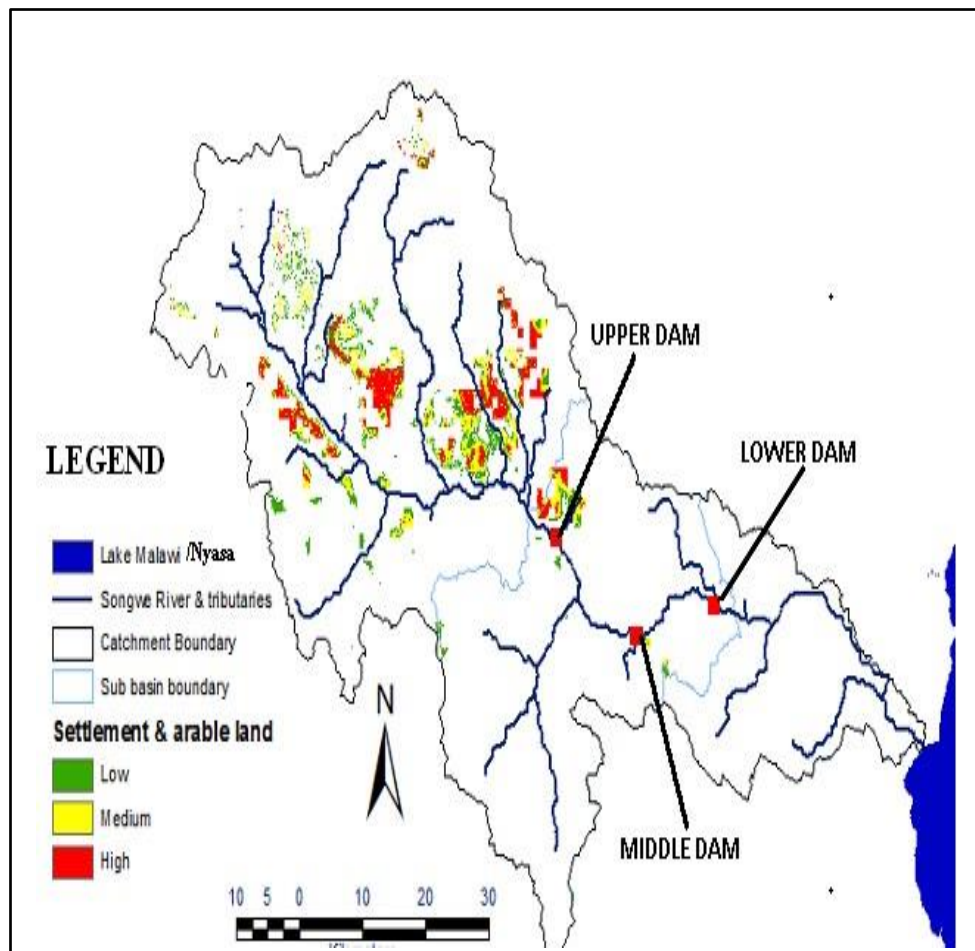
The Songwe River Basin covers four districts; Chitipa and Karonga in Malawi, Ileje and Kyela in Tanzania, covering a total area of 4200 square kilometers of which 1,974 square kilometers is in Malawi and 2,226 square kilometers in Tanzania (Feasibility Study Report, 2003). The area is characterized by forest destruction and unsustainable farming practices. This area was selected for this study to provide the researcher with holistic view of causes of environmental degradation. Some of the

socio economic activities in the study area include; farming, small businesses, employment and sale of firewood and charcoal. Poverty is endemic in the area as people live on less than one United States Dollar per day. The other reason for selecting this area was to examine socio economic activities of people as the area seemed more affected by environmental degradation.

Chitipa District lies to the North West of Northern Region of Malawi. It is located between longitude 33<sup>0</sup> E and 34<sup>0</sup> E and latitude 10<sup>0</sup> S. Chitipa covers a total area of 4288 square kilometers. It shares international boundaries with Ileje District in Tanzania to the North. Isoka District in Zambia to the west. Locally it shares boundary with Rumphi District to the South and Karonga District to the North East. Chitipa has two physiographic zones; the plateau zone and the plains zone. The plains which mostly covers the area of TA Mwabulambya lies between 1000m and 1500m above sea level, while the plateau zone which covers the areas of TA Mwenemisuku, TA Mwenewenya and TA Nthalire lies between 600m to 3000m above sea level. It has a total population of 179,072 of which 86,152 are males and 92,920 are females (GOM, 2011). People earn their living from subsistence farming. Main food crop is maize while tobacco is their major cash crop seconded by coffee grown in Misuku Hills.

The main study site is the area covering TA Mwabulambya and TA Mwenemisuku. A total of fourteen villages were included for the study, namely: Misuku, Muwanga, Chilashi Chipwela, Chatu, Mughoma, Iponjola, Lufita, Chinunkha, Ifumbo, Ichinga, Chitipa Town and Zingwala along the Songwe River- at the crossing point of the foot bridge that connects Malawi and Tanzania. A

total population of the villages covered was 78972 (MNSO, 2011). The average elevation for the study area is 1500m. On average, 80% of the soil in the study area is loamy. While 20% is sandy. Temperatures are generally warm to hot in the plains, but very cold in the hilly areas of Misuku and on the foot of Mafinga hills during the cold season. Rainfall ranges from moderate to heavy.



**Figure 3.1: The Songwe Drainage Basin**

**Source:** [www.mdpi.com/journal/sustainability](http://www.mdpi.com/journal/sustainability) (16 August 2014)

Rainfall distribution in the study area is not uniform. The rainy season in the study area starts in November and ends in May. Rains reach the pick in the months of December, January, February and March. It is less heavy in the month of November

and moderate in the month of April. Traces of rain are also experienced in May, June, September and October. Months starting from May to August are very cold in some places, while September, October and November are the hottest months.

The study area is endowed with a diversity of species of vegetation. The dominant vegetation is *miombo* woodland and few exotic trees planted close to homesteads. The few exotics include: *Gmelina arborea*, *mangifera indica* and wild palm species on the plains of Chitipa. Montane evergreen forests are found in highland areas of Misuku Hills. The tropical rain forests include Mughese Forest Reserve, Wilindi Forest Reserve, Kasumbi Forest and other isolated woodlots found in the study area. The best judgement of soil fertility are the plants themselves. In the upper basin, covering areas of TA Mwabulambya and TA Mwenemisuku, soil fertility is poor and makes it difficult for farms to produce without applying fertilizers, especially CAN and Urea for top dressing. However, exceptions are noted along Songwe Riverbanks that enjoy frequent deposits of fertile soils that are washed away from upstream.

### **3.3 Research Design**

This study followed an exploratory research study design. The exploratory research design was chosen since the purpose of the research was to examine the causal relationship between two variables poverty and environmental degradation (Saunders *et al.*, 2007). This design assisted the study to explore environmental degradation problem and its relation to poverty existing in the study area. This design was best suited to this study as it assisted in answering the research objectives.

### **3.4 Research Approaches**

Both quantitative and qualitative approaches were applied in this study. The multiple methods were useful in providing opportunities for the research to answer research questions. The multiple methods allowed the researcher to better evaluate the extent to which research findings could be trusted and inferences drawn from them. Quantitative method involved administration of a semi-structured questionnaire (Appendix 1). Quantitative methods also helped the researcher to understand the logic in which theories address the objectives. Other methods used were focus group discussions (FGDs) and participant observations. Qualitative methods assisted the researcher to interact with different groups of individuals. In so doing ideas related to culture and the environment were captured from a social cultural context.

### **3.5 Target Population**

The total population of Chitipa District is around 178,904 (GoM, 2011). It is estimated that each household in Chitipa District has five members. Thus, out of the available population, it is estimated that there are 35,782 households. The population around the study area is estimated at 111,900 (GoM 2011). Out of this, about [62.3% (69,721)] are in TA Mwabulambya and [24.5% (27,426 )] are in TA Mwenemisuku, [13.2% (14,753)]are around Chitipa Boma.

According to the average family size of 5 members, the target population gives about 22,380 households. Therefore,[ 0.58% (130) ]of the targeted population was selected as the sample size. However the average number of respondents to different questions was 122. While in some cases the number of respondents was higher and in other cases lower.



### **3.6 Sampling Techniques and Sample Size**

Purposive or judgmental sampling was applied in this research. It involved hand picking of subjects on the basis of their specific characteristics. The technique enabled the researcher to use judgment on selection of cases. This technique provided the researcher an opportunity to work with very small selected samples that were particularly informative and capable of providing the required information. The major units of data collection were households. Households were, selected using judgment based on the situation on the ground. Key informants and focus groups were also used as units of data collection. Total number of respondents selected for this study was 130. This sample size was drawn from a total population of 111,900 (GoM 2011) around the study area. The total number of respondents included, household heads, key informants and members of focus groups.

This technique was most suited for the study as it enabled the researcher to use judgment in selecting cases that best answered research questions and the set objectives. This technique also provided the researcher an opportunity to work with very small selected samples that were particularly informative and capable of providing the required information as (Neuman, 2000) cited by Saunders et al. (2007) explains. This sampling technique was appropriate as the findings from data collected from the initial sample were used in providing way to extend the sample into subsequent cases (Saunders et al., 2007).

### **3.7 Sources of Data**

The study utilized both primary and secondary data sources. Secondary data was obtained from documents including books, papers, theses, journals newspapers

articles, atlases and pamphlets. Primary data included information collected from respondents through questionnaires, focus groups discussions, key informants such as district commissioners, traditional authorities, environmental officers, agricultural officers and village headmen as well as participant observations.

### **3.8 Data Collection Techniques**

Various techniques were used during data collection. These techniques included administration of questionnaires, key informant interviews, focus group discussions and participant observations. Key informant interviews included forest officers, agriculture officers, chiefs, teachers and local leaders at various levels. The mixed methods technique provided better opportunities for the researcher to obtain proper answers for research questions and to allow better evaluation of the extent to which research findings could be trusted and inferences made from them.

The mixed methods technique allowed triangulation to take place. For example, focus group interviews were a valuable way of triangulating data collected by other means as Saunders et al., (2007) explains. Quantitative method involved administration of semi-structured interviews. It also helped the researcher to understand the logic in which theories and research questions especially conditioning factors that influence both the link between types of poverty and behavior and the link between behavior and natural resources.

#### **3.8.1 Household Heads' Interviews**

Semi structured questionnaires containing both open ended and closed questions were used to collect information from respondents. The information required, included,

education attained, agriculture information, knowledge about environmental issues, type of crops grown, energy for cooking and heating, livestock ownership and sources of income.

### **3.8.2 Focus Group Discussion**

Focus group discussions were guided by the interview guide questions provided in appendix 2 at the end of this document. Focus group discussions involved mixed groups of respondents. Participants in focus groups were a mixture of adults and youth, males and females. The categorization of participants in focus groups was deliberately organized to enable them participate freely and to solicit diverse views. The focus group discussions assisted the researcher to understand the perception and attitude of respondents towards the environment. It also enabled the researcher to probe deeper into the issues due to questions that were being raised by participants.

### **3.8.3 Direct Observation**

Direct observation was one of the tools employed in collecting data, this Direct observation was one of the tools employed in collecting data, this took two forms; primary observation and experiential data. Primary observation enabled the researcher to take note of what happened or what was said by respondents during time of research. This information was mostly about what observers interpreted regarding what they saw or perceived. While experiential data collection was based on the researcher's perception and feelings experienced as the research work went on (Saunders, 2007). Direct observation played a vital role in answering research questions and research objectives as it provided information that could have missed by employing other means alone to collect data.

### **3.9 Data Analysis, Processing and Presentation**

Both quantitative and qualitative data analysis procedures were applied. Quantitative data which took the form of numerical presentations such as simple counts of frequency of occurrences and costs of products. This type of data which included all the quantifiable data whose values could be measured numerically as quantities was analysed quantitatively. Whereas all the qualitative data that had non-numeric data, which could not be quantified, was analyzed qualitatively, (parallel) by using the application of excel software and Statistical Package for Social Science (IBM SPSS 20).

Content analysis was part of the technique that was used for analyzing data collected in this study. Content analysis was used on qualitative data with attributes which seemed related to some fixed categorizations. In this case, content analysis was used to consider the responses as reflecting either altruistic or egoistic interests only to the extent that they contained attributes associated with either of the two categories of interest.

However, in case of quantitative procedure, data whose values were measured numerically as quantities were analysed quantitatively. This involved creating simple tables or diagrams that show the frequency of occurrence and using statistics such as indices to enable comparison establishing statistical relationships between variables to complex statistical modeling. (Saunders *et al.*, 2007).

### **3.10 Validity and Reliability of the Research Instruments**

The validity and viability of secondary data collected in this study were much dependent on the source. The researcher made an assessment and ensured that the data

that were used in this study were obtained from reliable sources. The researcher selected data from large and well-known organisations such as government departments. For example, information regarding demographic issues was drawn from National Population Census and from National Statistical office. These are reputable organisations and information from such sources is quite reliable.

The researcher also looked at the methods by which the data were collected and tried to ascertain the preciseness that was needed by the primary user. In other words if the primary user of the data used high standards to achieve precise information. The researcher had every reason to take it as valid and reliable data. The researcher also looked at response rate in case of secondary data collected through a survey. A survey with high response rate was considered as more reliable than a survey with low response rate (Saunders et al., 2007).

Copyright statements on documents such as journals, articles and other publications provided authenticity that warranted ownership (who is responsible) for the data. Such documents are deemed more reliable. In this regard, (Saunders et al, 2007) argues that one has to look at copyright statements and the existence of published documents relating to the data to help validation. Saunders et al., 2007 further state that printed publications are regarded as more reliable than other sources.

### **3.11 Ethical Considerations**

The first ethical aspect was that the researcher ensured that permission was sought from interviewees before interviewing them. Permission was also sought from traditional leaders (village headmen) before going into the area. The other ethical

aspect was that respondents were assured of confidentiality of all the responses they gave, and that the research was for academic purposes only therefore there was no need for them to worry about the outcome. This was done so that they would be free to give answers without fear of being accused of any response given. The other ethical aspect was that respondents were the ones that determined convenient time for them to be interviewed. This was done in order to avoid disrupting them from their engagements. Respondents were also told the purpose of this study. This was done in order to clear them from any fear. Respondents were also assured of their freedom to withdraw from participating in this research if they so wished.

The researcher maintained objectivity in this study. Personal opinions in collecting data were not included. In group discussions, participants were not influenced in any way. In other words, the results recorded are the views of participants and not the researcher's views. The researcher did not ask leading questions that could have compromised objectivity.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

This chapter presents the findings and discussions of the findings of the study. The findings are centered on the objectives of the study; causes of environmental degradation and socio-economic activities of the people in the study area. The findings are divided into three themes that include; cooking and heating energy, farming practices and cultural practices. The findings are a reflection of people's views that came out during face-to-face interviews, focus group discussions, as well as responses from the questionnaires. of respondents classified as demographic, social and economic characteristics.

#### **4.2 Demographic Characteristics**

Demographic characteristics of the respondents included sex, age, tribe, household size and education qualifications. Although not significantly different, the study showed some slight differences in responses to the questionnaires. This was however considered as a mere coincidence. For example, the percentage of male respondents in the whole survey was 67% (82). This was much higher than that of female respondents [33% (41)]. This pattern was replicated in livestock keeping. Out of 120 livestock keepers [62% (74)] were male respondents, while 37.8% (45) were female respondents.

However, in as far as ownership of asserts is concerned, results have revealed that male headed families own more livestock than the female headed. This study found

that there are three main tribes in the study area which are Lambya, Ndali and Sukwa. The largest group is Lambya, followed by Sukwa and Ndali. The Lambya is mostly spoken in the area covered by Traditional Authority (TA) Mwaulambya with a population of approximately 69,721 (GoM 2011). Although Lambya is the main language spoken in TA Mwabulambya, there are several other smaller languages such as Chibandya, Mambwe, Bemba, Chinyika, Chinyiha and Chinamwanga just to mention a few.

The second largest tribe is Sukwa. Sukwa language is spoken by the Sukwa tribe. The Sukwa language is spoken both in TA Mwenemisuku and part of TA Mwabulamya. Ndali is mostly spoken in the eastern and north east of Misuku Hills. Ndali language is also spoken in Tanzania in the district of Ileje. The population of Misuku is 27,426 (GoM,2011). The population around Chitipa Boma is 14,753 (GoM, 2011). Being a district headquarters, people from different backgrounds are found here. Therefore several languages (more than 10 languages) are spoken here.

Another demographic characteristic was education level of respondents (Table 4.1). The highest number of respondents about 48.4% (59) had attained Malawi School Certificate of Education (MSCE). The majority of those that had completed MCSE were in the age group of (33-40) years. Those that had attained Junior Certificate (JC) were 27, representing (22.13%). While those that had completed primary education (Std 8) and below were 21 representing (17.21%). Only (15) representing 12.30% attained tertiary education. Results have shown a significant difference between male respondents, who went up to Malawi School Certificate of Education, (42) representing 68.86% compared to female respondents (17) representing 13.93%.

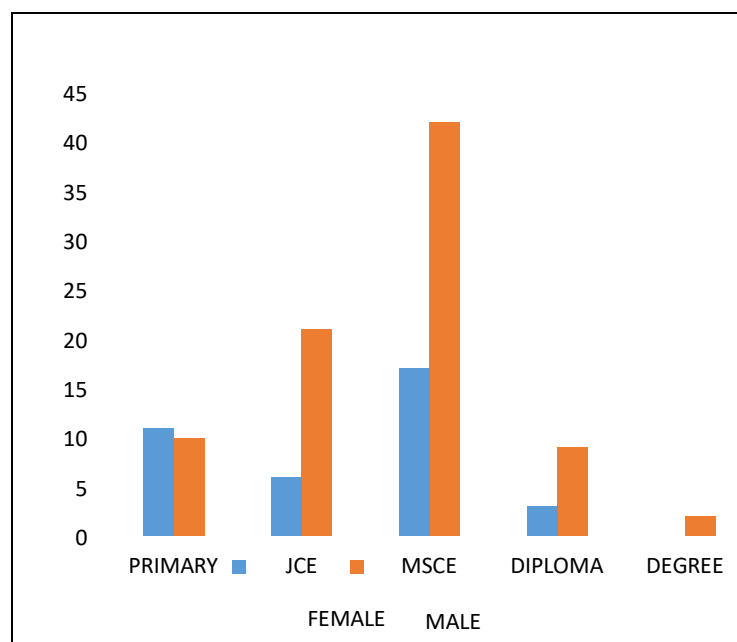


Results have also show that more male respondents [(84) 68.86%] attend school, compared to 38 (31.14%) female respondents.

**Table 4.1: Level of Education Attained**

Education level attained	Total Frequency	Total Percentage	Male	Percent age	Female	Percentage
			Frequency		Frequency	
Primary	21	17.21	10	8.20	11	9.01
Junior certificate	27	22.13	21	17.21	6	4.92
MSCE	59	48.36	42	34.43	17	13.93
Diploma	12	9.84	9	7.38	3	2.46
Degree	3	2.46	2	1.64	1	0.82
<b>Total</b>	<b>122</b>	<b>100</b>	<b>84</b>	<b>68.86</b>	<b>38</b>	<b>31.14</b>

Source: Field Survey, 2015



**Figure 4.1: Level of Education Attained by Sex**

Source: Field Survey, 2015

This scenario could be attributed to several factors including; girl child being preoccupied with house chores, in a family that put pressure on them. The other factor affecting girls is early marriages. Many girls drop out of school as early as sixteen years of age in order to get married.

Girls in families are looked upon as less beneficial to parents. In this regard, girls are encouraged to marry early so that parents can benefit through dowry (bride price). When girls get married, it becomes a relief to parents from the burden of looking after them. Due to this tendency, some girls are forced into marriage as early as fifteen years of age.

However, the Government of Malawi, in one of the sitting of the National Assembly passed a law to prohibit marriages below the age of eighteen (GoM, 2012). Many families prefer to invest education in male children. Male children are expected to take care of parents in old age. As for girls, once they get married, they have to leave parent's home to join husbands. All these issues came out clearly during focus group discussions. Dependency on male children with a view to receiving care and financial support in old age is also common in India and China where most poor couples believe in having many male children to do the work and care for them in old age (Miller, 2007).

In this regard, Miller quotes a saying used in India and China which says "Rear a son, and protect yourself in old age". Results have also revealed that the majority of respondents were below tertiary education. However many of them attained the Malawi School Certificate of Education (MSCE). Basing on these results, it could be concluded that low incomes in most families, contributed to low tertiary education attainment.

The other limiting factor to enter college or university institutions in Malawi is due to limited space. Previous studies do not say anything about the availability of

higher education facilities in the area. According to other studies carried out, primary schools are said to be many in the study area. However, despite the availability of many primary schools and free primary education in Malawi, drop out rates are said to be high. The report further states that secondary schools are few in the area. However, there is no college or university there (FSR, 2003). Due to high rate of school drop outs, and failure to go further with education, means three things; first, chances to secure well-paying jobs for better income are slim which means over-exploit the natural resources around them for their survival. Third, it is difficult for people who have not gone to school to follow and appreciate natural resource conservation practices. So they will degrade the environment ignorantly.

**Table 4.2: Number and Distribution (%) of Respondents by Age**

<b>Age range (years)</b>	<b>Frequency</b>	<b>Percentage</b>
18-25	19	15.57
26-32	28	22.95
33-40	29	23.77
41-48	22	18.03
49-56	14	11.48
57 and above	10	8.20
<b>Total</b>	<b>122</b>	<b>100</b>

Source Field Survey, 2015

Another demographic characteristic was the age of respondents as shown in Table 4.2. Results have shows that the majority of respondents (29) representing 23.77% were in the age group of (33 - 40 years). The other big group of respondents (28) representing 22.95% were in the age group of (26-32 years). The third group of respondents (22) representing 18.03% were in the age group of (41-48 years). However (19) respondents, representing 15.57% were in the age group of (18.25

years). Results have also shown that the least of respondents (10) 8.20% were in the age group of 57 years and above. With regard to age, the majority of respondents were of the ages ranging between 18 and 48 years.

The majority of respondents 29 representing (23.77%) were in the age group of (33-40 years). The second largest age group of respondents was (26-32 years). There were 28 respondents in this group representing 22.95%. (Table 4.2) The least number of respondents were in the age group of 57 years and above. In this age group, there were only 10 respondents of which 4 were male (3.8%) and 6 were female (4.92%). Similarly, in the age group of (49-56) there were only 14 respondents, of which 8 were male and 6 were female.

In these results variations have been noted in the age groups of (33-40) years and (41-48) years. In both of these age groups, there were more male respondents than female respondents. In the age group of (33-40) years there were 22 male respondents against 7 female respondents. While in the age group of (41-48) years there were 19 male respondents against 3 female respondents. Reasons for variations in responding to questionnaires were not established.

Another demographic characteristic was the sex of respondents (Table 4.3). Although there were no significant differences in responding to the questionnaire, results revealed that there were more male respondents in this study [60.66% (74)] versus female respondents [39.34% (48)]. There were also more male respondents in the age group of (33-40) years (22) representing 18.03% as compared to female respondents (7) representing 5.74% in the same age group. But there were

more female respondents (17) representing 14.28% in the age group of (26-32) years in comparison with male respondents [(11) 9.24%] of the same age group. There were also more male respondents [(19) 15.57%] in the age group of (41-48) years than female respondents [(3) 2.45%] of the same age group. The study was not able to establish causes of such variations.

**Table 4.3: Distribution of Respondents by Age and Sex**

Age range	Frequency (Male)	Percentage	Frequency (Female )	Percentage
18-25	10	8.20	9	7.38
26-32	11	9.02	17	13.93
33-40	22	18.03	7	5.74
41-48	19	15.57	3	2.45
49-56	8	6.56	6	4.92
57+	4	3.28	6	4.92
<b>Total (n = 122)</b>	74	60.66	48	39.34

Source: Field Survey, 2015

With regard to age, the majority of respondents both male and female were of the ages ranging between 18 and 48 with the majority of them in the age group of (33-40 years) 29 respondents representing 23.77%. The second largest age group of respondents was (26- 32 years). There were 28 respondents in this group that represented 22.95% (Table 4.2). Another demographic characteristic was the family size. The study revealed that on average the size of a family in Chitipa was 5 members. This was slightly less than the national (Malawi) average household size 5.1(MPC, 2008). The study also revealed that most households were male-headed accounting for [60.66% (74)]. As opposed to female headed households [39.34% (48)].

### **4.3 Causes of Environmental Degradation**

Causes of environmental degradation included farming practices such as cut and burn, (Plate 4.1) and shifting cultivation (Plate 4.2), cooking and heating energy, and application of chemicals and fertilizers to crops, as well as tobacco curing and tobacco related constructions.

#### **4.3.1 Cut and Burn Farming Practice**

The cut and burn farming system is practiced in Chitipa District. This farming system has its origin in Zambia. It involves cutting 100% of vegetation around the selected area, then pile and burn the wood. Mounds of soil are formed on the burnt spot before they are cultivated and planted with finger millet (FSR 2003). At the time of research, patches of burnt up pieces of land were seen in many places. Out of the 122 respondents [50% (61)] are engaged in subsistence farming. The prevalent crops are maize, millet, rice, soybean, coffee, bananas, sunflower, finger millet and tobacco. This practice is condemned due to its serious negative impact on the environment (Feasibility Study Report, 2003).

The poor are the victims of environmental degradation as well as being the agents. They are the agents since some of them get involved in advocating messages to protect the environment. They are short run maximisers; they try to meet the needs of the present at the expense of the future. The poor and the hungry, who are usually desperate for means of survival, often destroy their immediate environment in order to satisfy their immediate needs. They cut down forests and their livestock overgraze in marginal land.



**Plate 4.1: The Cut and Burn System on the Banks of Songwe River**

Source: FSR, 2003

#### **4.3.2 Shifting Cultivation**

This study revealed that shifting cultivation was one of the major causes of environmental degradation in the area. Shifting cultivation usually follows cut and burn system. The two systems follow each other. The results revealed that 50% of the respondents were involved in either of the two practices. It usually starts with the cut and burn system which is basically done in order to grow millet on.

However, millet is usually grown on that piece of land for one season. In the following seasons other crops such as rice, beans or maize are grown on that piece of land. Farmers who practice this system believe that millet can only do well on the

burnt up piece of land because of potash. Therefore if they have to grow millet again, they have to identify another piece of land where they have to do the cutting and burning again. This is how shifting cultivation comes about. However, according to the agriculture officer in Chitipa, millet can grow and give good yield if planted in the same way maize is planted. Therefore shifting cultivation is not necessary.

### **Farming Practice**



**Plate 4.2: Shifting Cultivation can Cause Environmental Degradation**

Source: Feasibility Study Report, 2003



**Table 4.4: Number and Distribution of Crops Grown in the Area**

<b>Crop</b>	<b>Frequency (farmers)</b>	<b>Percentages</b>
Maize	71	47.02
Soya bean	24	15.89
Bananas	14	9.27
Coffee	13	8.61
Millet	13	8.61
Tobacco	9	5.96
Rice	4	2.65
Sunflower	3	1.99

Source: Field Survey, 2015

According to results on Table 4.4, maize crop, is widely grown in the area and takes up 47.02% of the total farming activity. This indicates the magnitude of shifting cultivation that takes place in the area. Maize crop, as well as soybean and millet are usually grown on patches of land where cut and burn activity has taken place. Soyabean and millet in total contribute about 24.5 % of farming activity. This means that the three crops that are directly affected by shifting cultivation in total contribute about 71.52% of farming activities that benefit from shifting cultivation. Therefore, the frequency in table 4.4 implies the level of shifting cultivation in the area.

This study revealed that major crops that grew in the area were; maize, soya bean, bananas, coffee, millet, tobacco rice and sunflower (Table 4.4). The study also revealed that 71 respondents that represent 38.37% grew maize in their gardens. 24 respondents representing 12.97% grew soya bean. 14 respondents representing 7.56% grew bananas, 13 respondents that represent 7.02% grew millet. It was

established that millet was mostly grown for *nsima* and *beer*. It was also observed that shifting cultivation was a common practice in the study area due to millet growing. Thirteen (13) respondents representing 7.02% grew coffee. 9 respondents representing 4.86 % grew tobacco. The 3 respondents representing 1.98% grew sunflower and 4 respondents representing 2.16% grew rice.

However, 34 respondents representing 16.37% did not grow any crop. Maize which is a staple food in the area is grown by most families. Soya bean a fairly new crop in the study area is predominantly grown for cash. Soya bean has nutritional values to human beings. According to the findings indicated in Table 4.4, 34 respondents did not grow any crop, could be attributed to many factors such as; non availability of farm land or inability to work on the farm due to old age or illness. The study also established that the 34 respondents who did not grow any crop, were among those who had low incomes.

**Table 4.5: Cooking and Heating Energy**

Source of energy	Frequency	Percentage
Fire wood (urban & rural)	120	80.33
Charcoal (urban)	29	19.33
Charcoal ( rural)	1	0.34
<b>Total</b>	<b>150</b>	<b>100</b>

Source: Field survey, 2015

The study revealed that the dominant source of cooking and heating energy in Chitipa District, was fuel wood and charcoal (Table 4.5). Out of the 150 respondents [80.33% (120)] were using firewood. This included both rural and

urban dwellers. However, [19.33% (29)] respondents were using charcoal for their cooking and heating. It was also discovered that more charcoal was used in urban settings [19.33% (29)] than in rural settings [0.34% (1)]. The 0.34% of charcoal used in rural communities was mostly in local foundries (*mafulilo*).

Mafulilo is where scrap metal is heated at very high temperature, melted and forged into local farm implements. It was also established that fuel wood and charcoal were obtained from natural forests. This practice was discovered to be one of the major causers of deforestation in the district. Deforestation results in low rainfall that leads to poor harvests. Since people depend on farming for food and income, low harvests lead to starvation and poverty (Miller 2007).

The total number of respondents for sources of cooking and heating energy is inflated due to dual usage of the resource. Some households used both charcoal and firewood but were treated as separate users. This happened especially to urban dwellers. Firewood is the most commonly used source of energy for cooking that accounts for 88% in Malawi. Firewood usage accounts for 96% in the rural areas and 42% in the urban

According to the Population Housing Census (MPC, 2008), use of other sources of cooking and heating energy in rural areas, accounts for 0, 4% only. Since much of the cooking and heating energy comes from firewood, there is enough evidence why deforestation is taking place in the study area.

**Table 4.6: Chemicals and Fertilizer Application**

<b>Type of Input Applied</b>	<b>Frequency</b>	<b>Percentage</b>
Fertilizers/Chemicals	43	35.25
Organic Manure	16	13.11
Fertilizers and Organic Manure	7	5.74
No Application	56	45.90
<b>Total</b>	<b>122</b>	<b>100</b>

Source Field Survey 2015

Results on Table 4.6 have shown that the majority of respondents neither use any chemical nor apply any input to their crops. Out of 122 respondents, [45 90% (56)] do not apply any input to their crops. However [35.25% (43)] respondents apply chemicals.

While [13.11% ((16)] respondents use organic manure. And [5.74% (7)] mix chemical fertilizer and manure to their crops. Besides adding fertility to the soil, chemicals used as a means to control pests can have adverse effects to the environment. Some chemicals once used, accumulate in water, and are harmful to aquatic life. Other studies recommend that, the use of agro-chemicals in the gardens should be restricted to those that degrade easily in the soil, water and air. (FSR, 2003).Feasibility Study Report (2003) further reveals that there are two types of pesticides that have been used in Malawi.

The first type of chemicals that have been used consists of the persistent organo-chlorides, such as, aldrin lindane, DDT and endosulfane. These chemicals accumulate

in both the soil and water for a long time and were banned in Malawi. They are dangerous because they accumulate in fish and human through the food chain. It was therefore recommended that these chemicals should never be used in the Songwe River basin (FSR, 2003).

The other group of chemicals, comprise the non-persistent chemicals, that consists of insecticide, mainly the carbamate compounds such as carbaryl, aldicarb and carbofuran amongst the herbicides and plant regulators such as, atrazine, metalochlor, chlorthal- dimethyl, butralin, MCPA, 2,4-D glyphosate and paraquat. Among the fungicides used are the copper oxychloride and flutriafol (FSR, 2003).

The recommended fumigants are methyl bromide and ethyl dibromide. These chemicals are not traced in the soil, river waters as well as the air. According to the report written by Ravnborg (2003), agro chemicals are also considered to constitute a serious threat to the environment. More than 85% of the farming households in Miraflor –Moropotente and Condenga in Nicaragua use herbicides. Approximately one third of these farmers reported at least one incidence of poisoning after the application of either herbicides or pesticides to their crops.

#### **4.4 Socio-Economic Activities**

##### **4.4.1 Sources of Income of Respondents**

The major sources of income in the study area were farming, employment, business and charcoal making (Table 4.7). Farming was found to be the major source of income where people make USD 22,327.26 accounting for 50.55% of the total

income in the study area. Average income from farming was USD452.75/annum and USD37.73/month. Since farming is the major source of income, it implies that the area is subjected to low income considering that farm produce do not have an established marketing system in this particular area. This means that people do not get good prices for their farm produce This scenario subjects people to continued environmental degradation for their survival.

**Table 4.7: Income from Different Sources**

Source of income	Respondents	Total amount (USD)	Percentage
Farming	48	22,327.26	50.55
Employment	38	14,788.49	33.48
Business	11	6,651.26	15.06
Charcoal	7	398.06	0.91
<b>Total</b>	<b>104</b>	<b>44,165.07</b>	<b>100</b>

Source Field Survey, 2015

Despite agriculture being the major source of income, the area has remained poor. The money realized falls short of the required income level. Considering that the exchange rate of Malawi Kwacha to United States Dollar during the time of research, was, (MK557.39 = 1USD).

Total income from employment was 19 368.13 USD (33.48%) giving an average income of 389.17 USD/annum and 32.43USD /month. Total income from business was 6,651.26 USD (15.06%) giving an average of 604.66 USD per person/annum which is translated to 50.39 USD / month. Total income from charcoal sales was 398.06 USD that gave an average of 56.87 USD per person /annum translated to 4.74 USD per person/month. The total income from all the sources in the area

was 44, 165.07 USD giving an average income of 424.66 USD per annum translated to 35.39 USD per month. According to the World Bank updated international poverty line. (2015), people whose income is less than 1.90 USD per day are regarded as poor. Since results of these findings have revealed that the average income for people in the area is around 35.62 USD per month.

Other studies conducted in Malawi by Integrated Household Survey in 2004/2005 also explain the poverty status in the country. Results of the studies indicates that 52.4% of the population which is 6.3 million, Malawians live below the poverty line (Langa 2009). Previous studies indicate that there are few non governmental organizations operating in the area. The few existing organizations are; the Malawi Social Action Fund (MASAF) Smallholder Coffee Authority (SCA) Catholic Development Commission in Malawi (CADECOM ) and Food for Asses (FFA).

The focus of these organizations is on soil and water conservation, soil fertility improvement, livestock integration for small stock such as goats and rabbits. These organizations aim at improving livelihood of communities in their areas of operation (Feasibility Study Report, 2003). The Feasibility Study Report (2003) also reveals that there are very few opportunities for employment in agriculture since much of the labour comes from family members. The Feasibility Study Report, further states that the area of study lacks formal business establishments and inadequate credit facilities to finance the establishment of income generating activities.

However, the Malawi Socio Action Fund (MASAF) is involved in assisting the most vulnerable households, such as widows, orphans, the aged, and people

with chronic illness. The vulnerable people are engaged in doing public work like rehabilitating roads, constructing foot bridges and cleaning drainage systems within their locations. After doing the work they are paid 1.08 USD per each day worked. Usually they work for six or twelve days (captured from the MASAF document).

**Table 4.8: Income from Different Sources**

Source of income	Number of Respondents	Total amount realized from various sources in MK/USD Rate: being 557.39	Percentage
Farming	48	MK16,298,900 (29,241.46 USD)	50.55%
Employment	38	MK10,795,600 (19,368.13USD)	33.48%
Business	11	MK4,855,419 (8,710.99USD)	15.06%
Charcoal	7	MK290,581 (521.32 USD)	0.91%
<b>Total</b>	104	MK32.240,500 (57,841.91USD)	100%

Source: Field Survey, 2015

The total income in the study area from various sources was MK32,240,500 (57,841.91 USD), out of this total income 50.55% of the respondents got MK16,298,900 (29,241.46USD) from farming. Results indicated that much of the income came from farming. Employment was second amongst sources of income where 33.48% of respondents got MK10,795,600 (19,368.13USD) Income from business was MK4,855,419 (8,710.99 USD) for 15.06% of the respondents. While total income realized from sales of charcoal was MK290, 581 (521.32USD). The average annual income for each household, was about MK310,000 (556.16USD) This translates to MK25, 833.73 (46.44USD) per household per month. This figure is much below the United States Dollar. According to Swanpoel *et.al.* (1998) income of less than one USD per day is a sign of poverty. Therefore, according to

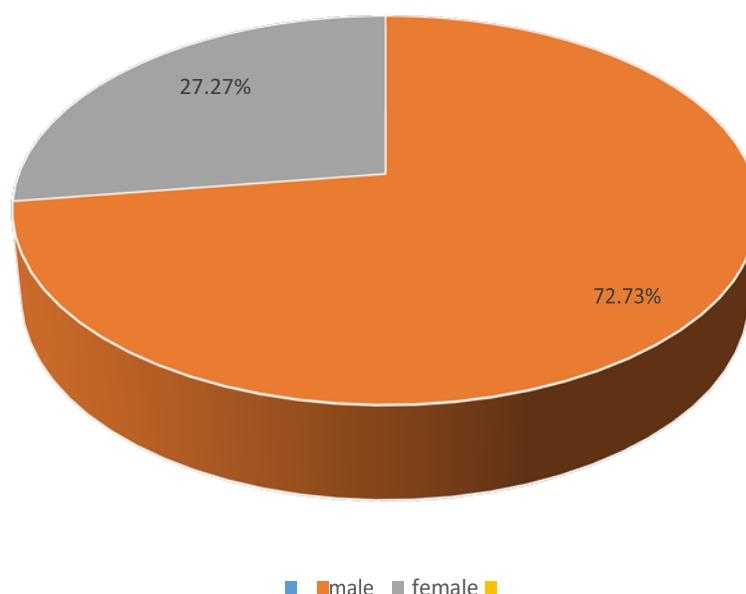


the findings of this study, there is justification in concluding that the study area is poverty stricken.

**Table 4.9: Number Distribution (%) of Income from Farming by Sex**

<b>Sex of respondents</b>	<b>Income</b>	<b>Percentage</b>
Male	MK11,854,500 (21,267.87USD)	72.73%
Female	MK4,444,400 (7,973.59USD)	27.27%
<b>Total</b>	<b>MK16,298,900 (29,241.46USD)</b>	<b>100%</b>

Source: Field Survey, 2015



**Chart 4.1: Income Distribution by Sex**

Source: Field Study, 2015

Total income from male respondents was MK11, 854,500 (21,267.87USD), representing (72.73%). This was higher than that of female respondents which was MK4, 444, 400 (7,973.59USD) representing 27.27% of total income. (Table 4.7). Average annual income for male respondents was MK227, 971(408.99USD)

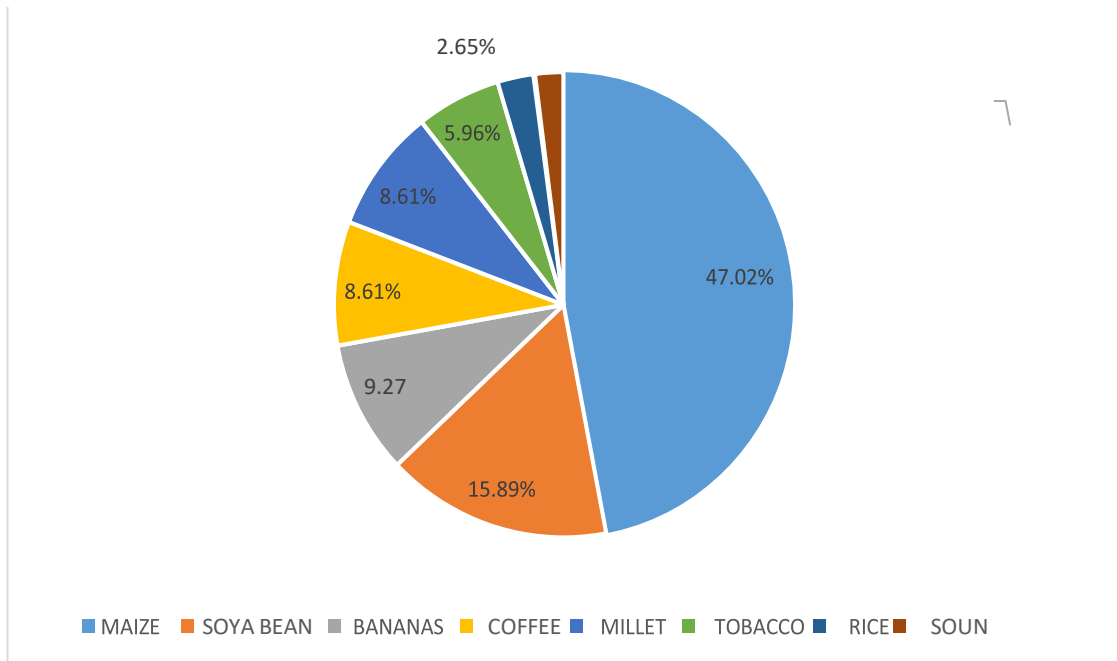
calculated to MK18,997.58 (34.08USD)/month. While average annual income for female respondents was MK193, 234.78 (346.68USD) representing 27.27% translated to MK16,102.89 (28.89USD)/month. Results indicated that income was highly influenced by sex. The findings have shown that male respondents were in control of more income than female respondents.

**Table 4.10: Income Generation Based on Types of Crops Grown**

<b>Crops</b>	<b>Total average amount realized from each crop ?</b>	<b>Percentage</b>
Maize	MK7,663,742.78 (13,749.34 USD)	47.02
Soya bean	MK2,589,895.21 (4,646.47 USD)	15.89
Bananas	MK1,510,908.03 (2,710.68 USD)	9.27
Coffee	MK1,403,335.29 (2,517.69 USD)	8.61
Millet	MK1,403,335.29 (2,517.69 USD)	8.61
Tobacco	MK971,414.44 (1,742.79 USD)	5.96
Rice	MK431,920.85 (774.90 USD)	2.65
Sunflower	MK324,348.11 (581.90 USD)	1.99
<b>Total</b>	<b>MK16,298,900.00 (29,241.46 USD)</b>	<b>100</b>

Source: Field Survey 2015

Maize crop is grown for both food and cash. It is also the biggest income generator with a total income of MK7, 663,742.78 (13,749.33USD) representing 47.02% of the total income (Table 4.8). The second income generator is soya bean MK2,589,895.21(4,646.47USD) representing 15.89% of the total income. Total income from farming is MK16, 298, 900(29,241.46USD) representing 50.55% of the total annual income from various sources in the study area Results have indicated that sunflower generated the least income to the study area, MK324,348.11(581.90USD) representing 1.99% of the total income that was generated in the study area.(Field survey 2015).



**Chart 4.2: Income Distribution by Crop**

Source: Field Study, 2015

#### 4.4.2 Farming Practices and Cattle Rearing

The best judgment of soil fertility is the plants and crops grown on it. The upper basin that covers areas of TA Mwabulambya and TA Mwenemisuku, soil fertility is poor and makes it difficult for farms to produce without applying fertilizers or organic manure. However, exceptions are noted along Songwe River banks that enjoy frequent deposits of fertile soils that are washed away from upstream (Feasibility Study Report, 2003). Most of the respondents interviewed, confirmed that for the past two decades soils had lost fertility so much that no crop could give good yield without applying fertilizer or organic manure. Some of them, especially those who owned herds of cattle, in response to focus group questions, revealed that they had resorted to applying cow dung manure to their crops in order to improve productivity.

It was revealed during focus group discussions that as an intervention, the Government of Malawi introduced fertilizer subsidy to assist poor farmers. But the program faced a lot of challenges such as; poor rainfall in some places, failure to deliver fertilizer to farmers on time, and at times fertilizer was given to the landless as well as to the non productive citizens due to political influence. Previous studies carried out in this area revealed that soil fertility had gone so low to the extent that farmers could hardly produce without the use of fertilizers.

However, due to inability to afford commercial fertilizers, farmers have to look for alternative means to improve soil fertility (Feasibility Study Report, 2003). The Feasibility Studies further reveals that slash and burn practice was used by subsistence farmers as an alternative means to improve soil fertility. The ash generated by the burn is meant to fertilize the land. However, the fertility created from ash, lasts for one season only. Besides, the slash and burn practice results in removal of natural vegetation that leaves the land bare and prone to splash erosion (FSR, 2003).

#### **4.4.3 Construction of Houses**

Housing investment as a major user of wood products has been rapidly growing and causing wide spread deforestation (World Bank Report, 1992). Likewise, brick burning has significantly reduced the forest cover in the study area. Studies have shown that most houses are constructed of burnt bricks and iron sheets. In the lower attitudes, houses are having permanent walls, but roofs are made of grass which significantly damages the environment. Bricks which are made from clay leave holes behind.

On the other hand, if bricks are to be burnt, on average 1-1.75m (cubic meter) of wood is required to burn 1000 bricks. On average, 35,000 bricks are required for the construction of a medium house. *Miombo* species are favoured for this job because of their high calorific values. This practice is prominent around Chitipa town and along the road leading to Misuku Hills (Feasibility Study Report (2003). It was observed during research that, 75% of houses were made from baked brick walls with thatch roofs. However, 25% of houses were made from unbaked brick walls and corrugated iron sheets. It was also established that Small households use forest trees to bake bricks and for construction work.

During interviews, especially in focus group discussions, 75% of respondents revealed that they had resorted to building houses with burnt brick walls with iron sheet roofs because they are more durable. However 25% of respondents revealed that they constructed their houses with raw bricks and thatch roofs because they are affordable. Similarly, previous studies carried out in the area reveal that houses were constructed of materials such as bamboos, mud and burnt bricks.

The studies further discovered that a few households were living in houses made of woven bamboos. These studies also indicated that over 21% of people living in woven bamboos were from Malawi side while 6% were from Tanzania. These were mostly male headed households. On the other hand all female headed households were living in houses that were made of poles and mud. In Chitipa/ Karonga 28% of the houses were constructed of burnt bricks. This has resulted in severe deforestation around the two districts.

#### 4.4.4 Tobacco Curing

At present sun drying of tobacco is a common practice in the middle and upper basin. The practice is manifested by wide spread of thatched sheds outside most households. This is a positive trend compared with the old system of using firewood for drying according to reports from the District Forestry Officer for Chitipa (Feasibility Study Report, 2003). The report further explains that thatched sheds though to a smaller extent, also contribute to environmental degradation through the use of materials such as wild bamboos, grass and poles from natural forests. The forest materials are used for making barns where tobacco is cured before taking to markets. In comparison, forest materials used for making tobacco sheds, use less wood products than fuel wood used for curing tobacco (FSR, 2003).

#### 4.4.5 Timber Production

Timber industry was found to be another causer of environmental degradation. Research findings revealed that timber making for constructions and furniture had flourished over the past few years. It was also known that timbers were mostly obtained from home grown forests (pine trees). However, timber in small quantities were also obtained from natural forests. Timber from natural forests was made from trees such as *mungwina* (*Breonadia salicina*) and *muwanga*. Timber from these species is chosen because it is hard and resists termite attack (GoM, 2008).

Loggers use selective cutting to remove the best timber from natural forests. This topples many other trees because of their shallow roots and the network of vines connecting trees in the forest's canopy (Miller, 2007). Miller (2007) further states that although illegal exports of legally and illegally harvested timber to developed

countries contribute significantly to tropical forest depletion and degradation, domestic use accounts for more than 80% of the trees cut in developing countries.

In many parts of the world, the construction of logging roads increases access to the forest and result in colonization by peasant “squatters” who seek to clear the forest for agriculture. Besides, when the roads are not properly located and constructed, they eventually become gullies and serve as channels for the flow of water. Therefore logging contributes to environmental degradation. As such wilderness and logging cannot coexist (Enger *et al* 2007).

**Table 4.11: Applications of Chemicals and Farm Inputs**

Type of input applied	Frequency	Percentage
Fertilizers / chemicals	43	35.25
Organic manure	16	13.11
Fertilizers and organic manure	7	5.74
No application	56	45.90
<b>Total</b>	<b>122</b>	<b>100</b>

Source: Field Survey, 2015

Results on Table 4.9 have shown that 35.25% (43) of respondents apply chemical fertilizers to their crops, 13.11% (16) respondents apply organic manure to their crops, 5.74 % (7) respondents apply both chemical fertilizer and organic manure to their crops. However, 45.90% (56) of respondents do not apply any input to their crops. According to the findings, results have revealed that most respondents in the study area do not apply anything to their crops.

#### **4.4.6 Cattle Rearing and Overgrazing**

Along the Songwe River banks, in TA Mwabulambya, the area is overstocked according to livestock personnel in Chitipa. On average there are about 1-5 cattle per household (Feasibility Study Report, 2003). However, livestock production is hindered because the area is infected with tsetse flies and diseases. Apart from tsetse flies, livestock production has been reduced because of the occurrences of trypanosomiasis disease in the area. Cattle and other animals were found to be other causes of environmental degradation in the area. Out of the 125 respondents 20% (25) owned a total of 133 cattle. On the other hand, 23.2% (29) of respondents owned a total of 131 goats and 9 sheep. 6.4% (8) respondents, kept a total of 18 pigs.

It was also established that 56 households kept a total of 1,730 chickens. Respondents also indicated that their animals were kept on free range. The study by MPC (2008) revealed that there were about 18,969 cattle, 11,492 goats, 2,452 sheep and 2,692 pigs in TA Mwabulambya alone in 1999. This translated to an average of 3 cattle per household. It is clear from the previous (MPC, 2008) and from this study, that the population of cattle has over the past sixteen years, increased by 6%.

It is also clear that the increase in cattle has put more pressure on limited land resource. In many parts of the world, where human population pressures are great, overgrazing is a severe problem. As populations increase, desperate people attempt to graze too many animals on the land. They also cut down trees for fire wood that disturbs vegetation cover (Enger *et al.*, 2007). Enger *et al.* (2007) further explains that where tropical rainforests have been cleared for pasture and cattle ranches



established, the soil quickly loses its scarce nutrients and becomes useless. According to the findings of this study, due to increase of animal population in the study area, soils have become poor leaving the land unproductive (Field Study, 2015).

**Table 4.12: Number and Distribution of Animals Kept in the Area by Household**

Type of animal	Quantity	Households
Cattle	133	24
Goats and sheep	131(goats) 9 (sheep)	29
Chickens	1730	56
Pigs	18	8

Source: Field Survey, 2015

It was established that availability of public land and loss of soil fertility in the gardens enabled people to move from one place to another in search of better yields. Tobacco estates which were found to be taking a lot of farm land left much of the land without vegetation. In every village of the study area, two or three respondents owned estates that represented 20% of the total farm land.

#### **4.4.7 Cultral Practices and Beliefs**

The participant observation revealed that residents bury the dead using mats made from reeds. Reeds (*Phragmites*) in this area wildy grow along river banks. Reeds (*Phragmites*) are a prevalent plant where some species of birds locally known as (*namatone*) make nests. HIV/AIDS exacerbated occurrence of deaths that enforce extensive destruction of reeds in course of burying relatives in the study area. It was also observed that wild bamboos (*Bambusa ssp.*) (*mashembe*) in local language

which were a dominant plant in some parts of the study area a few decades ago are almost extinct. The action was attributed to cultural beliefs.

People in the area are afraid of planting these bamboos. They believe that whoever plants this type of bamboos, risk to die once the planted bamboo dies or dries up. As a result, no person has ever dared to plant this type of bamboo. This particular species of bamboo is very sensitive to heat and due to bush fires which are common in the area it has become almost extinct.

Instead the local people have continued to destroy the other species of trees. The study discovered that if people were to plant this type of bamboo, which apparently has many uses, could be assisting in preserving other natural trees, especially young trees widely used in tomato growing areas. The study also observed that culture plays a big role in the preservation of vegetation. Culture demands that trees and other vegetation at graveyards should never be tampered with.

As a result, sporadic sites of preserved small forests are found within and around settlements. The preserved shrines help to mitigate environmental degradation. The small forests around graveyards attract rainfall due to evapo-transpiration that takes place. In addition vegetation around graveyards play a significant role in checking soil erosion and in a way contribute to reduction of environmental degradation in those areas. In situations where there are no established graveyards, trees locally known as *mulambilambi* and *kachele* are planted on the graves' as a symbol to show where one is buried for future identification. This practice also helps in preserving natural trees

that form part of vegetation. Basing on cultural practices and beliefs practiced in the area of study, it can be concluded that respondents are quite aware of environmental issues. This is manifested in their efforts to preserve and to protect their shrines from degradation. However, the only challenge they face is to balance between preserving natural resources or using those resources for their immediate needs

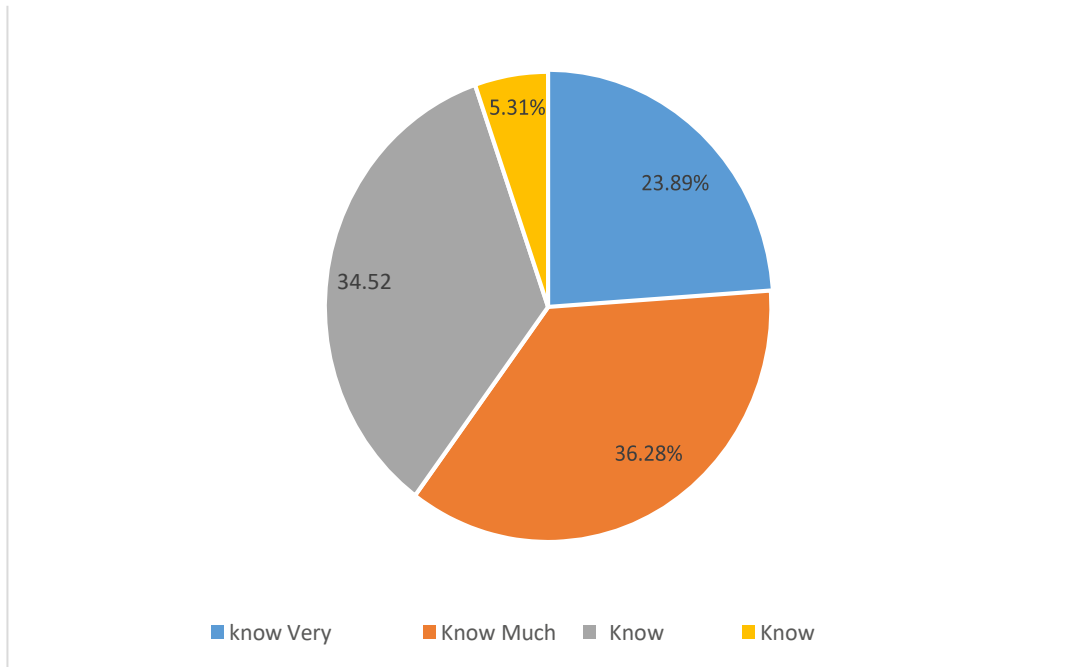
#### **4.4.8 Social Economic Activities**

Major sources of income in the area were farming, employment and business. Out of 110 respondents, 43.64% were engaged in farming activities. 34.55% were in formal employment. 10% were doing business. 6.36% were in employment and farming. 4.55% were in business as well as farming. About 0.9% of the respondents were engaging in both business and employment. In view of the various social economic activities taking place in the study area, it can be concluded that respondents are aware of environmental issues since the majority of them about 43.64% are engaged in farming activities which are solely dependent on the proper management of the environment. Therefore, environmental degradation negatively affects production. Apart from farmers, the 34.55% respondents who are in formal employment are likely to be conversant with environmental issues. It is believed that people who are educated will have a better understanding of environmental issues.

#### **Awareness of Environmental Issues**

The study revealed that most of the respondents were aware of environmental issues. This was manifested in focus group discussions, whereby the discussions focused on cultural practices and beliefs, knowledge about environmental issues and concerns about environmental degradation. The study established that despite their

awareness and concerns about environmental degradation people, have continue to degrade the environment due to lack of alternative means of survival



**Chart 4.3: Knowledge about Environmental Issues**

Source: Field Survey, 2015

About 36.28% of the respondents interviewed were aware about environmental issues and 34.52% knew little about environmental issues (Table 4.11). However, 23.89% of the respondents knew very much about environmental issues while 5.31% knew nothing about environmental issues. Results have revealed that more respondents know much about environmental issues, followed by those that know little about environmental issues. On third rank are those who know very much about environmental issues. While those who know nothing about environmental issues are represented by 5.31%. Regarding knowledge about environmental policies 86.73% are aware that there are policies in place that govern environmental issues. While only 13.27% are not aware whether there are any policies or not. Despite awareness of environmental issues and regardless of environmental

policies that are in place, communities have continued to degrade the environment. Probably this has been the case due to lack of alternative means for rural livelihood.

**Table 4.13: Knowledge about Environmental Degradation**

<b>Knowledge about environmental degradation</b>	<b>Frequency</b>	<b>Percentages</b>
Know very much	27	23.89
Know much	41	36.28
Know little	39	34.52
Know nothing	6	5.31
<b>Total</b>	<b>113</b>	<b>100</b>

Source: Field Survey, 2015

#### **4.4.4 Concern about Environmental Degradation**

Majority of the respondents about 89.38% were concerned about environmental degradation, while 10.62% were not concerned about environmental degradation. There is an insignificant difference between those who are concerned about environmental degradation and those who take part in controlling environmental degradation. However, 83.19% of the respondents take part in measures of environmental degradation. There were only 16.81% respondents who do not take part in measures towards mitigation of environmental degradation. This trend could be attributed to lack of environmental tips which are usually on the radio.

Due to poverty, not many families own radios (MPC, 2008). According to Integrated Household Survey (2005) on poverty and asset ownership, it came out clear that there were only 107,907 radios against the population of 179,072 in Chitipa. Results of the findings indicate that 71,165 people, (14,233) households did

not have radios in their homes. On the role taken to fight environmental degradation, [(68) 59.65%] of respondents felt that replacing trees in places that have been degraded, would help in bringing back forest cover which has been lost. About 23 (20.17%) of the respondents said that education messages regarding environment issues to communities would bring positive results. Those that did not have any idea on how environmental degradation could be addressed were 23(20.18%). Cutting down natural trees for firewood and burning charcoal for sale was found to be the most common practice among the people in the rural set up within the study area. Both fire wood and charcoal were sold to urban communities. On the other hand, results of the findings revealed that not much charcoal was used in rural areas. It was discovered that this was due to extensive use and availability of plenty fire wood. The other reason was due to non availability of charcoal burners. Charcoal burners in rural areas are scarce and expensive to purchase.

## CHAPTER FIVE

### DISCUSSIONS

#### 5.1 Socio-Demographic Characteristics of Respondents

Demographic characteristics of the respondents included sex, age, household size and education level. With regard to sex, the study revealed that male respondents were in control of more resources than the female respondents. For example male respondents (72.73%) had an annual total income of MK11, 854,500 (21,267.87USD) of the total income in the area. However, female respondents (27.27%) had a total annual income of MK4, 444,400. (7,973.59USD) These differences in income distribution could be attributed to customary laws that restrict women from exclusively owning land as indicated in the Malawi Land Policy of 2001.

Livelihood in the study area is mainly dependent on land where crops are grown for both food and for sale. The other reason is that married women are not allowed to do any business without the consent of their husbands. This restriction deprives women right of having more income. Another demographic characteristic was the age of respondents. The findings showed that there were more male respondents in the age group of 33-40 years. The male respondents were 22 representing 18.03% of those who responded to the questionnaire.

However, there were 7 (5.74%) female respondents in the same age group. This difference in responding to the questionnaire was replicated in the age group 41-48 years where 19 (15.57%) were male respondents versus 3 (2.45%) female

respondents of the same age group. Probably these variations came about as a result of more male going to school than the female. Women in poor countries are usually poorly educated and do not have disposable income. They are dependent on their husbands or on other family members for their livelihood (Enger *et al.* 2007).

Enger *et al.* (2007) further states that, at the United Nations International Conference on Population and Development that was held in Cairo, Egypt in September 1994, the idea of improving the education status of women was promoted. It was felt that this would lead to improved financial standing for women. A similar situation was experienced in Austria where the standard of education for female was relatively lower than that of males. The situation significantly put the women folk at a disadvantage in terms of income (Women in Austria, 1985 -1995).

Family size was another demographic characteristic studied in this research. The study revealed that the average family size in the study area was 5 members per household. This is slightly less than 5.1, the Malawi national average family size. Five family members in each household is a worrisome situation. Such numbers create pressure on land, forest resources, food and financial resources in the family, as it is said that, more people more mouth to feed.

Another demographic characteristic was the level of education of respondents. The study revealed that not many respondents had the opportunity to go further with their education. The majority of them had completed the MSCE. And very few of them



had gone up to university level. Failure to obtain high education leads to poor management of natural resources. Results have also shown that respondents with reasonable education had a better understanding of environmental issues. People who have gone further with education are able to appreciate nature and to join in efforts to fight against environmental degradation (NAPA, 2006).

Generally, Malawi is constrained by extreme poverty of the most vulnerable groups who also happen to be less educated. The situation makes it difficult to transfer new technologies to most people, with regard to implementation of long term sustainable environmental plans (NAPA, 2006).

## **5.2 Socio-Economic Activities**

The socio-economic activities taking place in the study areas included farming, employment, business and charcoal making. Results indicated that the major socio-economic activity in the study area was farming. Farming accounted for 50.55% of the total income in the study area. However, some farming practices such as cut and burn; and shifting cultivation have had negative impact on the environment.

The cut and burn system which is said to have originated from the neighbouring Zambia, leaves land without vegetation (Feasibility Study Report, 2003). It was established from the study that the cut and burn system was mainly for the growth of millet. The benefits of this system are of short term only. After growing millet for one season, the land is abandoned and a new piece of land is identified. Consequently, much of the land is left without vegetation. Researcher observation

discovered that the open land due to bad farming systems was prone to soil erosion and to loss of fertility. It was also observed from the study that siltation of the Songwe River was a direct result of soil erosion from the hilly areas of its catchment. Soil erosion, loss of soil fertility and siltation were due to bad farming practices (FSR, 2003).

Crops grown in the study area among others included; maize, soya beans, bananas, coffee, millet, tobacco, rice and sunflower. Results revealed that maize was the major crop grown in the study area. The total annual income from maize was MK7, 663, 742.78 representing 47.62% of the grand total income from farming. The annual total income from farming activities was MK16, 298, 900. Results of the study also indicated that millet was one of the crops grown at a small scale. Total annual income from millet was MK1, 403, 335.29 representing 8.61% of the income realized from farming activities.

However, the study observed that, although millet did not provide substantial income to the area, the effects of growing this crop had more negative impact to the environment than any other crop. The study further established that all the farming activities in the area were still at subsistence level. No commercial farming was seen anywhere in the study area. Money circulation was observed to be low a situation that resulted in poor living standards. Poor living standards was confirmed through assets ownership by most households.

Assets owned by a household are a measure of the socio-economic status. According to Integrated Household Survey (H15-2), 2005 (HIS), poverty

headcount and percentage distribution of Malawi's asset ownership by district, indicated that in Chitipa assets ownership was comparatively lower than other districts. For example, there were only 107,907 radios, 67,557 bicycles and 3,624 oxcarts in the whole district (Integrated Household Survey, 2005). The study also indicated that poverty rate in Chitipa was at 67.2% and ultra poverty rate at 30.4% while in the neighbouring district of Karonga, poverty rate was at 54.9% and ultra poverty rate at 28.3% (Integrated Household Survey, 2005). The study reveals that comparatively, households in Chitipa district are poorer than those in Karonga district.

## **5.2.1 Employment**

### **5.2.1.1 Employment was One of the Socio-Economic Activities in the Study Area**

Due to lack of industries and availability of very few government establishments, people in formal employment accounted for only 33.48% of the total labour force. Total annual income realized from employment was MK10, 795,600.(**19,368.13USD**) translating to an average of MK23, 674.56 (**42.73USD**) per month. The challenge here was twofold, scarce employment and low remunerations.

## **5.2.2 Business**

In the business sector, the study indicated that few respondents were engaged in business operations. Out of 104 respondents 11(10.58%) respondents were doing business. Total annual income from business operations was MK4, 855,419, (**8,710.99USD**), giving an average income of MK441,401.73(**791.90USD**)/year calculated to a MK bout 36,783.48 (**65.99USD**)/month.

It was discovered from this study that in recent years there had been an increase in houses made from baked bricks. Respondents revealed that in the past, houses were made from raw clay soils. Walls of houses were made by compressing damp clay soils in specially made wooden boxes according to the desired thickness and height. At one time houses were constructed using raw brick walls.

However, this was for a very short period. Unfortunately, people had to change to baked bricks as they seemed more prestigious and durable. The study observed that baked bricks had significantly reduced the forest cover within the surrounding areas. Such developments negatively affect weather patterns. Erratic weather patterns have a negative impact on farm harvests that eventually result in poverty (Feasibility Study Report, 2003).

Another socio-economic characteristic among the respondents was livestock rearing. Results of the study reveal that many respondents 95.90% (117) reared livestock. Among those that reared livestock, the majority of them, 47.86% (56) reared chickens. This was followed by those that reared goats and sheep 24.78% (29). Those who reared cattle came third, 20.51 % (24). While 6.83% (8) reared pigs. It was established from this study that at least every household kept some kind of livestock. It was further established that on average each household kept about 5.54 cattle, 4.52 goats and sheep, respectively; 31 chickens and 2 pigs. Considering that most of the animals reared were on free range, possibilities to overgraze the area were obvious. The study also revealed that animals especially cattle were used by many families to pay lobola (the bride price).

It was also revealed from this study that some livestock such as goats and chickens were often used as relish for special visitors in homes. It was also observed from this study that livestock especially cattle made trails along their pathway. These trails created ways for soil erosion. Results of this study have shown that chicken were the most popular among the livestock. This could be attributed to several reasons. First, chickens are easy to acquire and cheap to rear. Second, chickens provide the most favourite dish for visitors in homes. Third chickens do not require much room in terms of housing. Fourth markets for chickens are readily available because many can afford. Finally chickens provide easy manure to fertilize crops.

### **5.3.3 Income Level in the Study Area**

#### **5.3.3.1 However, One of the Economic Impacts in the Study Area was Income Level of the People**

##### **(i) Results have indicated that most of the respondents had their income below poverty line**

According to Swanpoel *et al.* (1998) any person whose income is less than 1USD per day is considered poor. In this regard, findings have shown that despite all the economic activities that take place in the study area, income levels are very low. According to the Feasibility Study Report (2003) carried out in the study area, produce is generally sold at low prices due to lack of reliable markets. Studies further indicated that poor produce prices are exacerbated by a poor road network and lack of reliable credit facilities for agriculture. Since farming is the main source of income, low produce prices leave farmers poor at end of the growing season. This is a clear proof that people have been subjected to poverty despite their hard work.

Unsustainable use of resources could therefore be justified. Enger *et al.* (2007) explains that a person who is worrying about his next meal, is not going to listen to lectures on protecting the environment.

Another economic characteristic of respondents was accessibility to village banking. Respondent especially female respondents were involved in village banking groups. Women in small groups of ten or twelve were engaged in the business of loans amongst themselves. However, this study has revealed that some of these loans did not benefit members due to high interest rates. In certain groups, interest was charged weekly and in other groups interest was charged monthly. The interest rates went up as high as 60%.

During the focus group discussions, some respondents indicated that they had to borrow money from elsewhere in order to pay back the loan borrowed for the sake of maintaining membership in the group. Female respondents revealed during focus group discussions that village bank meetings took much of their time. During focus group discussions, 90% of respondents disclosed that time spent on village banks took much of their time.

They regretted that time spent on village banks, could have been dedicated to other developmental work since they did not benefit much from village banks. Those who failed to pay loans had their personal assets confiscated to repay the loan. However, 10% of respondents were happy with village banks. Money realized from village banks enabled them to acquire new assets in their homes.

## **5.4 Causes of Environmental Degradation**

### **5.4.1 Farming system**

The study area, which is within the drainage basin, is characterised by extensive but unsustainable agriculture. Pressures on land resources were revealed by the presence of shifting cultivation combined with slash and burn farming practices. The slash and burn practice is believed to bring fertility to the soil. However, the belief has proved wrong since the expected fertility lasts for one season only.

In the next season farmers have to look for another piece of land where slash and burn is done once more. This encourages shifting cultivation that results in environmental degradation (Feasibility Study Report, 2003). The Feasibility Study Report further observes that mono-cropping, inability to fallow land and failure to plant perennials such as fruit trees is another contributing factor to environmental degradation. Previous studies have revealed that declining soil fertility leads to lower crop yields and that degradation of common property resources, pulls labour away from directly productive activities (Feasibility Study Report, 2003).

### **5.4.2 Shifting Cultivation**

Shifting cultivation is regarded as an unsustainable farming practice because of de-vegetation impact it has on the land and increased soil erosion. Shifting cultivation is practised in an effort to look for better soil fertility and more crop yield. However, the study has shown that this practice makes the situation worse as clearance of vegetation cover negatively affect rainfall patterns. Poor rainfall affect crop yield that result in poverty. Considering the economy of the area is agriculture based; poor harvest leads to shortage of food supplies and poverty (Field Survey, 2015).

Similarly, previous studies assumes that shifting cultivation is an exhaustive form of using soil and forest resources that leads to rapid decline in soil fertility, especially when growing population mean that the fallow period in-between land use gets shorter.

However, some researchers have noted that the level of education affect the adoption of some farming technologies. In this regard, Lwesya (2004) cited by Navicha (2010), is of the view that education attainment provides farmers with the basic skills that facilitate the transmission of technical knowledge enhancing keeping farm records and making simple calculation required for deciding on the economic benefits of a proposed innovation.

### **5.4.3 Cooking and Heating Energy**

Another activity in the study area that destroyed the environment was firewood collection and charcoal making. The report revealed that out of a total population of 178,904 in Chitipa, 164,021 representing 91.7% were using firewood for cooking, and 5,755 people representing 3.22% were using charcoal for cooking and heating. While 9,128 people representing 5.1% were using other sources of energy such as electricity, gas and paraffin.

The study observed that the major source of cooking and heating energy was firewood. Firewood was collected by cutting and drying natural trees from woodlots around homesteads. Firewood is used for all the cooking and heating in the homes. Firewood is also used for baking clay pots and for burning bricks with which to build houses. The study also revealed that main sources of cooking and



heating energy in Chitipa was firewood and charcoal (Malawi Population Census, 2008). It was also revealed in this study that charcoal was made in the area. It was observed that just like firewood charcoal was made from natural trees especially from the *miyombo* species due to their high calorific value. Charcoal was found to be mostly used in urban centres. While rural communities used more firewood. The little charcoal used in the rural was mainly in local foundries where scrap metals were heated at high temperature and forged into different shapes of farm implements, such as sickles and axes. Charcoal was also used in heating irons for pressing clothes. It was also learned in this study that charcoal made in rural areas, was only a source of income as most of them did not use it.

Illegal charcoal burning is said to be a common practice inside protected forests. Forest wood lands close to urban centres are more vulnerable to this practice. Previous studies carried out in the Songwe drainage basin, have revealed that charcoal exploited illegally from the surrounding forests in Malawi, finds its way into Tanzania markets across the Songwe River (FSR, 2003). The Feasibility Study Report has further revealed that efforts to control the movement of charcoal on the Tanzania side where stringent measures are in place, has proved futile as the cross border traders use undesignated routes to access markets (FSR, 2003).

This practice has been made worse due to lack of proper supervision. The government of Malawi stopped employing forest extension staff in 1995. therefore the job is too much for the few workers. Besides, lack of incentives like night allowance for the staff on duty, demotivated the few staff. As a result, vendors who deal in forest products face no resistance from authority as they go about looking for market.

This has contributed to deforestation in the area (FSR, 2003). Almost all of the charcoal made in the rural was transported by push bikes, oxcarts, wheel barrows as well as motor vehicles to urban centres where it was sold. Prices of charcoal varied according to changes in weather. During hot weather, charcoal was sold cheap. While in cold weather price went up. There was more demand for charcoal in cold season because apart from cooking, charcoal was also used for warming houses in order to keep bodies warm. Charcoal contributed to about 0.91% of income to the area. The study established that such income was much lower than what Swanpoel *et al* (1998) has described as a measure for poverty. However, even with such little income, charcoal was found to be the highest destroyer of forest cover.

Similarly fuel wood and charcoal made from fuel wood are used for heating and cooking for 2 million people in developing countries. This results in unsustainable cutting of trees in many areas. For example, Haiti a country with 8.5 million people was once a tropical paradise covered largely with forests. Now it is an ecological basket case because of the collapse of its forests, Soils and society.

**Table 5.1: Source of Energy for Cooking and Heating**

Source of energy for cooking and heating	Malawi		Urban		Rural	
	Number (people)	%	Number (people)	%	Number (people)	%
Total	12,615,298	100	1,881,010	100	10,734,288	100
Electricity	292,678	2	254,979	13.6	37,699	0.4
Paraffin	144,960	1	13,073	0.7	131,887	1.2
Gas	1,766	0	1,019	0.1	757	0.0
Charcoal	1,000,846	8	<b>816,128</b>	43.4	<b>184,718</b>	1.7
Firewood	<b>11,054,103</b>	88	785,970	41.8	<b>10,268,133</b>	95.7
Others	120,935	1	9541	0.5	111,094	1.0

Source: (PHC, Malawi, 2007)

According to the Population Housing Census (PHC) of 2008, firewood is the most commonly used source of energy for cooking in Malawi. Firewood usage accounts for 96% in the rural areas and 42% in the urban. More urban households use charcoal that accounts for 43% and electricity 14% for cooking (Table 4.12). In rural areas 1.7% households use charcoal and 0.4% households use electricity.

#### **5.4.4 Housing Investment**

Housing investment is a major user of wood products and it has been rapidly growing and causing widespread deforestation (World Bank, 1992). All environmental effects (deforestation) on the health and livelihood of the poor are directly or indirectly being felt. Some studies reveal that due to deforestation, agriculture expansion and overgrazing of livestock, there has been a widespread destruction of grassland causing environmental problem (Lieu *et al.* cited by Nayak, 2004).

Nayak (2004) further states that soil erosion is also taking place due to deforestation and overgrazing. For example, the vegetation cover on Mafinga Mountain in Chitipa District has been remarkably disturbed in the past because of logging and wood extraction for tobacco curing. Similarly, unregulated logging has been blamed for the existing state of deforestation in the Misuku Hills. Logging in Misuku Hills is mostly initiated by the neighbouring Tanzanians who buy woodlots from the local people and process timber. Timber is transported to Tanzania where more constructions take place. Similarly, many cases of logging in tropical countries is done by foreign corporations operating under government concession contracts. Once a country's forests are gone the companies move to another country, leaving ecological devastation behind (Miller, 2007). In a similar manner

Malawi Government and Raiply (a foreign company), are in a concession contract over Chikangawa Forest. Unfortunately, the forest under concession is almost gone due to extensive cutting down of trees. Most of the products made from these trees are exported to other countries.

### **5.5 Measures of Environmental Degradation**

Measures to curb environmental degradation were observed during field study. Forest plantations have been established on the forest edges and some inside natural forest. The man made forests were purposely planted to improve the vegetation cover and to serve as buffer zone against human impacts. Previous studies have revealed that forest fires in the plantations is an offence and punishable to offenders (Feasibility Study Report, 2003). Fire guards were observed around natural forests as well as around man made forests. It was observed that fire guards were purposely made to control bush fires from entering forest reserves. It was also learned from this study that forest fires were not as common in this area as they used to be in the past.

This was the case because people were afraid of committing the offence for fear of facing the punishment that had been instituted (Field Study, 2015). Results of this study revealed that 60.2% (68) of respondents were of the view that planting trees would be a solution to mitigate environmental degradation in the area. While 20.4% (23) were of the view that civic education on how to conserve natural resources would be the best measure to deal with environmental degradation. However, the other 20.4 % (23) of respondents did not have any idea as to how environmental degradation could be mitigated.

Results of this study demonstrated that, poor farmers adopt resource conserving practices because these practice contribute to increased productivity or output stability. They are therefore economically viable in the farmers' context of risk and resource constraints (Sain and Barreto, 1996 cited by Scherr (2000). Such dual purpose technologies are essential to achieve poverty reduction and environmental policy objectives.

In a similar manner, studies of livelihood strategies have revealed that although the rural poor may have limited resources, they still have considerable capacity to adapt to environmental degradation either by mitigating its effects on their livelihood or by rehabilitating degraded resources (Scherr, 2000). Scherr (2000) further states that over time local people develop technical and institutional innovations in natural resource management to reduce risk and adapt to or reverse degradation even as pressure increase.

Similarly studies carried out in Kano region in Nigeria indicate that small farmers were willing to forego short term income gains despite price and famine pressures in the interest of long term sustainable management strategies (Mortimore, 1989) cited by Duraiappah, 1996). Activities that will reduce pressure for fuel wood such as promotion of agroforestry income generating activities that will enable those with extra income to buy some energy saving stove is one of the measures taken to control environmental degradation. Improvement of soil and land management through improved extension services is another measure that controls environmental degradation.

However, research in Papua New Guinea among the Wola people of the Central Highlands, has indicated that soils are kept fertile for long periods of time after initial clearance of secondary vegetation by the use of indigenous soil conservation techniques such as soil mounds which incorporate compost from the cleared vegetation and combine this local soil management with the selection of crops such as sweet potato- that can prosper on the nutrient supply the mounds provide.

The result of this approach is a continued soil fertility under conditions of intensive land use and growing population (Sillitoe, 1998). As one of the measures to mitigate environmental degradation, Miller (2007) states that one way to reduce the severity of the fuelwood crisis in developing countries is to plant small plantations of fast-growing fuelwood trees and shrubs around farms in community woodlots. Miller further states that experience has shown that such community forestry projects have to involve local people for them to succeed.

For example, in Chitipa district, bush fires have been attributed to game hunting, wild honey collection and clearing of farm land. In addition some people set fire to encourage pasture regeneration. All these practices are done by the local people (FSR, 2003). Miller (2007) suggests that a second way to reduce unsustainable harvesting of fuel wood trees is to burn wood more efficiently by providing villagers with cheap, more efficient, and less polluting wood stoves or solar ovens and in the future electric hotplates powered by wind generated electricity.

During focus group discussions it was learned that the poor resort to harvesting natural resources at their disposal due to lack of alternative means of survival. For

example in those areas where they grow tomato for domestic use and for sale in order to earn money. Local farmers have to cut natural young trees to support tomato plants out-weighed by the tomato fruits. This is done in order to have money to support their families. This problem can be addressed by introducing a small (type) species of Chinese bamboo.

This type of bamboo is easily obtained and grows fast. It can be re-used for the next two seasons. There is another wild bamboo called *mashembe* in local language. This too, can be used to support tomato plants but traditional beliefs prohibits them to grow this type of bamboo. Local people believe that if you plant this type of bamboo, if it dies you also die. Due to poverty rural communities around the study area, most of who, cannot afford to obtain domesticated source of protein, resort to bush fires so that they can have meat from small wild animals. This problem can be addressed by the Malawi Government through small loans to communities.

## **CHAPTER SIX**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 Conclusions**

The main objective of this study was to examine the relationship between poverty and environmental degradation. The study focused on farming practices, sources of income, cooking and heating energy. The study looked into factors leading to environmental degradation. It also looked at cultural practices such as burying relatives which contributed to environmental degradation. The study also revealed that some farming practices and technologies such as cut and burn, shifting cultivation and use of some farm chemicals contributed to environmental degradation.

##### **6.1.1 Conclusion on Link between Socio-Economic Activities and Poverty**

The socio-economic activities that were carried out in the area were also examined. The study revealed that the major source of cooking and heating energy in the study area was firewood and charcoal. Firewood accounted for 80.33% and charcoal 19.67% (Field Survey, 2015).

In this regard, results indicated that charcoal, was a source of income to some people and that it accounted for 2.25% of the total income. The study revealed that greater part of income in the study area came from farming. Among the crops grown were; maize, soya bean, bananas, coffee, millet, tobacco, rice and sunflower. Maize was found to be the biggest income generator in the whole study area. It accounted for 47.02% of the total income realized from farming.



The study also showed some gender imbalances on certain issues. There were more male respondents, 60.66% than female respondents, and 39.34%. The imbalance based on gender was replicated in ownership of resources. Male respondents controlled 72.73% of total income from farming, while female respondents controlled 27.27%. Despite numerous economic activities that were taking place in the study area, it was observed that people were still poor. The average annual income for each household was found to be MK562.00 (1.25 USD) /day. This figure was found to be below what Swanpoel *et al.* (1998) describes as a yard stick for poverty line. With the available statistics, the study has shown that most of the respondents are in ultra poverty.

#### **6.1.2 Conclusion on a link between Socio-Economic Activities and Environmental Degradation**

On the causes of environmental degradation, a number of factors came into play. 61.7% of respondents attributed the destruction of forest cover to poverty. While 12.5% of respondents claimed that it was due to ignorance of the importance of the environment to human life.

The study also revealed that shifting cultivation come about as farmers search for better yields due to poor soils. Results of the study have revealed that the cut and burn *fikwebwe* farming system is specially done for the growth of millet. During the study, It was claimed by respondents that millet do better in patches of burnt up piece of land. However, it was also learned that the burnt up piece of land can only be productive for one season. In the next season the yield goes down and forces farmers to look for another piece of land. It was established that this farming

practice encourages shifting cultivation. The study has also shown that most of the respondents were involved in some kind of economic activity. Most of them relied on crop farming as their main economic activity.

However, many of them received low income from their sales. The majority also raised chickens basically for home consumption. It was also observed that chickens were sometimes sold to supplement income when they are in critical financial problems. It was also learned in this study that chickens were slaughtered and prepared as a special dish for important visitors.

The study has shown that some cultural practices have an impact on the environment. For example the scattered grave yard forest reserves serve to induce rain in the study area through transpiration. The study has also shown that mats made from reeds *fibonde* (in local language), contribute to environmental degradation. The reeds that are used for making these mats are a nesting facility for certain species of birds. Yet, culture demands that the dead must be buried covering bodies with such type of mats.

The study has also revealed that houses built with burnt bricks contribute to environmental degradation. It was established that about 1.75m (cubic meter) of wood was required to burn 1000 bricks. And that about 35000 bricks were required to construct a medium house. As such, the forest cover has been extensively removed. Results also revealed that the majority of respondents apply fertilizers and other chemicals to their crops. Chemicals in form of insecticide, pesticide and herbicides, once washed into rivers have adverse effects on aquatic life. Results also revealed

that 42.10% of the respondents did not apply anything to their crops, while 37.72% respondents applied fertilizers and other chemicals to their crops. However, 14.04% respondents exclusively applied organic manure to their gardens where 6.14% of the respondents applied combination of chemical fertilizer and organic manure.

In terms of education attainment, findings have shown that the majority of respondents did not have tertiary education. The majority of them 48.36% had attained the MSCE. The study has also shown that more girls dropped out of school as compared to boys. The findings are a clear indication of poverty. Considering the socio economic activities and the level of incomes, it can be strongly suggested that there is a strong link between poverty and environmental degradation. The available information has indicated that people have no choice but to use the available resources unsustainably.

## **6.2 Recommendations**

- (i) It was observed in this research that, greater part of environmental degradation is caused by lack of alternative energy sources. Therefore, this study recommends that, there is need to search and come up with alternative or new cooking and heating technologies.
- (ii) It has been found that some farming practices such as shifting cultivation cause environmental degradation, therefore there is need to come up with a new farming technology, which will control environmental degradation.
- (iii) The government needs to come up with incentives that will encourage rural communities to conserve natural resources such as forests. It is

therefore being suggested that those individuals or communities who can manage to establish woodlots should be rewarded in one way or another so that others can do the same.

- (iv) Rural communities should be given a chance to participate in policy formulation regarding issues that affect them.
- (v) There is need for the Malawi Government and NGOs to identify alternative sources of cooking and heating energy for rural communities and to provide them with loans for small scale businesses in order to improve their livelihood.
- (vi) Finally, there is need for deliberate policy that will ensure that both rural and urban communities use forest reserves sustainably.
- (vii) It is therefore not realistic to suggest that rural communities should stop using charcoal and firewood or forest products where there are no other alternatives put in place to replace the existing ones. Energy saving stove should be used. Charcoal should be processed in designated places away from forest reserves.
- (viii) There is a need to explore the possibility of using coal as an alternative source of cooking and heating energy, especially the type of coal which cannot be used in industries, preferably the one with more ash content such as lignite.
- (ix) Finally, areas which receive little rain due to destruction of trees or deforestation should be rehabilitated. Otherwise governments will be spending huge sums of money to support communities with relief food supplies every year. Re afforestation and tree planting should be emphasized.

## REFERENCES

- Alemu B. A., Nuppenau, E. A., and Bauer, S. (2013). The Causality between Poverty and Environmental Degradation in Ethiopia. *Agricultural Journal* 4(4), 202-207.
- Anup, S. (2005). Poverty and The Environment: Retrieved on 11<sup>th</sup> May 2017 from: <http://www.globalissues.org/article/425/poverty-and-the-environment>.
- Botkin, D. B., and Keller, E. A. (2005). *Environmental Science; Earth as a living Planet* 5th edition, New York: John Wiley and Sons.
- Broad, R. (1994). The Poor and the Environment; Friend or Foes? *World Development*, 22(6), 811-822.
- Duraiappah, A. (1996). Poverty and Environmental Degradation; A Literature Review and Analysis. CREED Working Paper Series No. 8. Free University, Amsterdam, Netherlands
- Enger, E. D., and Smith, B. F. (2007). *Environmental Science, A study of Interrelationships*, 8th ed. London McGraw-Hill.
- Forma, R., T. (2006), *Land Mosaics, the Ecology of Land Scapes*. Cambridge: Cambridge University Press.
- Helga, K. (1985). Women in Austria. The Federal Chancellery and Federal Minister for Women's Issues. Retrieved on 11th May 2017 from: <https://www.federal-chancellery.gv.at/women-s-affairs-and-equality>.
- Langa, W. (2009). *Social Economics of Rural Livelihood*. Study Manual.
- Lwesya, A. (2004). Impacts of treadle pump adoption on food security in Kasungu District, Malawi. (Unpublished) thesis Oslo, Norway

- Miller Jr, G. T. ( 2007). *Living in the Environment*. 15th edition. Luton: Sage Publications Inc.
- Munthali, K. G., Irvine, B. J., and Murayama, Y. (2011). Reservoir Sedimentation and Flood Control, *Sustainability Journal*, 3(1), 254–269.
- NAPA, (2006). Malawi's National Adaptation Programmes of Action. A Report Under the United Nations Framework Convention on Climate Change Environmental. Lilongwe, Malawi.
- O'Riordan, T. (2000). *Environmental Management*, 2nd edition, Harlow: Pearson Prentice Hall.
- Rasmussen, J. L., Schemmel, C. A., and Winternitz, K. A. (1992). *BSCS Biological Science, an Ecological Approach*, 7th Edition. Iowa: Kendal/ Hunt pub. Co.
- Rozelle, S., Huang, J. and Zhang, L. (1997). Poverty Population and Environmental Degradation in China. *Journal of Food Policy*, 22(3), 229-251.
- Russo, M. V. (2008). *Environmental Management: Readings and Cases 2nd Edition*. London: Sage Publications Inc.
- Sara, J. S. (2000). *Food Policy*, 25(4), 479-498.
- Shiva, V. (2005). *Stolen Harvest*. London: Zeed Books.
- Swanpoel, De Boer. (1998). *Breaking the Cycle of Poverty*, 4th Edition Johannesburg: Juta and Company Ltd.
- Todaro, M. P. (1997). *Economics for a Developing World, an Introduction to Principles, Problems and Policies for Development*. London: Longman Group Limited.
- WCED (1987), Report of the World Commission on Environment and Development Oslo, Norway.

## APPENDICES

### Appendix I: Interview Questions

#### Part A: Researcher's Identification and introduction

My name is Alec Phillip Malanga, a student at the **Open University of Tanzania (OUT)** pursuing a Master of Science Degree (MSc) in Environmental Studies. The main objective of this study is to examine the linkages between poverty and environmental degradation.

#### Part B: Respondent's personal details

- 1 Sex [ M ] [ F ]
- 2 Age distribution [15- 30] [31-46] [47 and above]
- 3 Academic qualifications [primary level] [secondary level ]  
[university level]

#### Part C

1. How much do you know about environmental issues?
  - A. Very much
  - B. Much
  - C. Little
  - D. Not at all
  - E. 90
2. Are there policies in place to deal with the environment?
  - a) Yes
  - b) NO
  - c) Not aware
3. If the answer is yes to question 2, how much do you like these policies?
  - a) Very much
  - b) Much
  - c) A little
  - d) Not at all

4. Are you concerned about environmental degradation? a) Yes, because I am indirectly affected  
b) I don't know what environmental degradation is all about
5. Do you take part in measures to control environmental degradation? a) Yes I do take part I plant more trees  
b) No at all, I don't know what to do.
6. If the answer is (a) to question 5, how? If it is ((b) why? (Explain briefly)

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

What is your source of income?

- a) Farming  
 b) Employment  
 c) Business  
 d) Others
7. If the answer is farming, what sort of inputs do you apply?  
 a) Chemical fertilizers and insecticides  
 b) Organic manure  
 c) Nothing at all
8. What crops do you grow?  
 (Tick the one that applies)

[Millet ] [ rice ] [ maize] [ soya bean] [ coffee] [ bananas] [

others ] On average how much is your income? Tabulate in

Per day	[	]
Per week	[	]
Per month	[	]
Per year	[	]

9. Has environmental degradation negatively affected you in any way?  
 (a) Yes  
 (b) No



10. If the answer is yes to question 10. How? (Explain briefly)

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

11. Do you keep any livestock

a) Yes

b) No

If yes, what type?      How many?

Cattle	(   )	[   ]
Goats	(   )	[   ]
Chickens	(   )	[   ]
Sheep	(   )	[   ]
Pigs	(   )	[   ]

12. How are they kept?

a) Free range

b) Intensive care (Kept indoors)

c) Semi intensive.

13. (a) What is your source of cooking and heating energy?

Firewood

Charcoal

Paraffin

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

14. (b) How is it obtained? (Home grown or natural forests) Explain

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

15. Why are people involved in activities that degrade the environment? [Explain briefly]

.....  
.....

16. (a) Is there anything that can be done to control environmental degradation?

- (a) Plant fast growing natural trees for firewood
- (b) Nothing can be done about it

17. (b) If yes, what is it that can be done? Briefly explain?

.....  
.....

**Thank you for completing this questionnaire**

## **Appendix II: Interview Guide**

The researcher's interest was to examine the linkages between poverty and environmental degradation

### **QUESTIONS**

To what extent has environmental degradation affected your livelihood?

*Probe:* In what ways has it affected you? (give examples)

Do you take part in mitigating environmental degradation?

*Probe:* What is it that you do?

What is your source of income? (employment, farming, business, selling charcoal/firewood

timber production, others)

*Probe:* How much money do you realize from what you do?(per day, per week per month per year)

*Probe:* Is the money you receive enough to provide you with the basic needs? (yes/no)

If farming is your source of income?

*Probe:* What crops do you grow? What are your farming practices? What inputs do you apply?

*Probe:* Do you think the practices you do in farming are good to the environment?

*Probe:* Is there anything you can do about it?

What is your source of cooking and heating energy?

*Probe:* Where is it obtained?

*Probe:* Is it a sustainable source

*Probe:* If it is not sustainable do you think there could alternative sources?

Do you keep any livestock?

*Probe:* what type and how many?

*Probe :* How are hey kept?

*Probe:* How much income do you realize from your livestock?

A participant observation study on the linkages between poverty and environmental degradation.

The purpose of the study was to examine the extent to which poverty can contribute to environmental degradation and how degraded environment can cause poverty.

The researcher made 5 visits to different sites of the study area.

Participant observations took three forms as follows;

**( a) Primary observation**

This involved noting and recording of what happened during the time of study, what was said and what was seen on the ground regarding environmental degradation.

**(b) Secondary observation**

These were statements by observers of what had happened or what was said. It involved interpretations of the observers' views and experiences.

**( c) Experimental data**

These were data collected on the researcher's perception and feelings as were experienced regarding the process that was being researched. It included keeping a diary of the perceptions that were being experienced as the research process went on. Through participant observations, the researcher concluded that poverty had a bearing on the

environment and that the degraded environment had an effect on human livelihood

**Appendix IV: Guide for Focus Group Discussion**

This group interview focused mainly on the linkages between poverty and environmental degradation. The individual group members, interactions and responses were both encouraged and more closely controlled in order to maintain the focus. Participants were selected because they had certain characteristics in common that related to the topic that was being discussed. For example livestock keepers were grouped together and farmers were also grouped together. Participants were encouraged to discuss and share their points of view without any pressure to reach a consensus (Krueger and Casey, 2000) cited by (Saunders *et al*, 2007).

The facilitator in the focus group discussions was the researcher himself. The facilitator kept the group within the boundaries of the topic that was being discussed. As much as possible the facilitator tried to generate interest among the participants for encouragement to discuss.

However, he made sure participants were not lead towards certain opinions. There were four focus groups in total. Each of the groups was composed of twelve participants. Focus group discussions were conducted in the open space under tree sheds. Discussions were conducted in places where no interference was experienced.

**End of questionnaire**

## **Appendix V: List of Figures, Plates, Charts and Tables**

### **List of figures**

Figure 2.1 conceptual frame work	31
----------------------------------	----

Figure 3.1 Map of Songwe Drainage Basin	35
---	----

### **List of plates**

Plate 4.1 The cut and burn system on Songwe River banks	54
---	----

Plate 4.2 Shifting cultivation can cause environmental degradation	56
--	----

### **List of charts**

Chart 4.1 Level of education attained	47
---------------------------------------	----

Chart 4.2 Income distribution by sex	68
--------------------------------------	----

Chart 4.3 Income distribution by crops	71
--	----

Chart 4.4 knowledge about environmental issues	81
--	----

### **List of tables**

Table 4.1 level of education attained	
---------------------------------------	--

Table 4.2 Distribution of respondents by age	49
--	----

Table 4.3 Distribution of respondents by age and sex	57
--	----

Table 4.4 Distributionnn of crops grown in the area	57
---	----

Table 4.5 Cooking and heating energy	59
--------------------------------------	----

Table 4.6 Chemicals and fertilizer application	60
--	----

Table 4.7 Income from different sources	63
---	----

Table 4.8 Distribution of income from farming by sex	67
--	----

Table 4.9 Application of chemicals and farm inputs	69
--	----

Table 4.10 Distribution of animals kept	75
---	----

Table 4.11 Knowledge about environmental degradation	82
--	----

Table 4.12 Sources of energy for cooking and heating	95
--	----