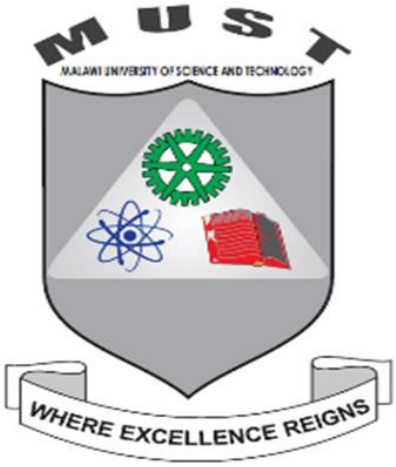


INVESTIGATING FLOOD HAZARDS ON RICE PRODUCTION ALONG SONGWE RIVER IN KARONGA DISTRICT

RAYMOND CHIBUMUZI GONDWE

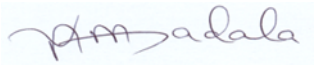
THYOLO, MALAWI

DISSERTATION SUBMITTED TO NDATA SCHOOL OF CLIMATE AND EARTH SCIENCES OF THE MALAWI UNIVERSITY OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE IN DISASTER RISK MANAGEMENT

MARCH, 2021

DISSERTATION APPROVED BY:

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ABSTRACT

Floods by definition is referred to as body of water which rises to overflow land which is not normally submerged (Ward, 1978). There are several types of flooding and some of them are riverine floods happen from the spilling of the major rivers and their tributaries and distributaries which is most extensive when the three major rivers are in peak stage at the same time, rainfall induced flood this kind of flood is most common in low-lying areas where the drainage facilities are not very organized, flash flood is characterized by a very sharp rise of water level in the rivers that causes sudden overbank spillages. The short durations and supercritical velocities often cause high degrading effects and storm surges this category of flood is also known as coastal flooding as storm surges are caused by tropical cyclone and leads towards massive damage of the lives and properties in the coastal areas. The primary reason behind the surge is the pressure differential in cyclonic storm and the high winds.

According to this study results show that flooding a long Songwe river in Karonga district is influenced by a number of factors and are categorized into two that is natural factors which include heavy rains, overflowing of rivers, lack of vegetation and channels with steep sides and human induced factors namely deforestation and poor agricultural practices.

Flooding has both positive and negative impacts. According to this study it has been found out that the negative effects outweighs the positive effects. That is why it is required to come up with the following possible solutions to alleviant the problem the communities are facing and these are construction of dyke or dam, planting other flood-resistant crops, agricultural diversification, improving rice varieties, afforestation or re-afforestation and good agricultural practices.

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Another appreciation should be extended to Malawi University of Science and Technology for giving me the opportunity to do this research in this programme.

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ACRONYMS/ABBREVIATIONS

DL: Danger Level

GDP: Gross Domestic Product

IFRC: International Federation of Red Cross

DCPCs: District Civil Protection Committees

ACPCs: Area Civil Protection Committees

VCPCs: Village Civil Protection Committees

DRP Act 1991: Disaster Relief and Preparedness Act of 1991

SPSS: Statistical Package for Social Science

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1. INTRODUCTION

Flood is a body of water which rises to overflow land which is not normally submerged (Ward, 1978). Floods are global hydro-metrological hazards and different types of floods are experienced in different parts of the world. In India, a river is said to be in flood when its water level crosses the Danger Level (DL) at that particular site.

Occurrence of floods is a natural phenomenon and man has to live with it right from the beginning. It is not just confined to monsoon in Asia but it is a globally pervasive hazard (Kale, 1998). Floods have ravaged portions of India from time immemorial but their impact was not felt earlier, since the floodwaters would spread over vast open countryside which was sparsely occupied. Floods can occur in many ways, usually in valley bottoms and coastal areas and be produced by a number of influencing conditions. Their locations and magnitudes vary considerably and as a result they have markedly different effects upon the environment.

The continent of Africa comprises 54 states, and its climatic conditions are incredibly diverse, ranging from equatorial to desert. Rainfall and river flows in Africa show high levels of variability across a range of spatial and temporal scales (Conway et al., 2009; Hamandawana, 2007; Laraque, Mahé, Orange, & Marieu, 2001; Sutcliffe & Knott, 1987).

This poses several complex challenges for the management of floods on the continent. These range from estimating extreme flood flows in ungauged catchments in arid zones in North Africa and managing flood regimes in large, transboundary river basins such as the Niger and Zambezi to reducing the vulnerability to floods of the 238 million people in sub-Saharan Africa who live in informal settlements (United Nation [UN], 2019). Based on the number of people affected, over the past 30 years, floods and droughts are the two natural hazards that have the largest humanitarian impacts in Africa (Lumbroso, Brown, & Ranger, 2016) and according to literature climate and landscape determine the relative magnitude of the flood event itself.

In view of the severe impact of floods on human society, many serious attempts have been made worldwide, including India, to improve the scientific understanding of the flood phenomenon.

In India, where floods are major annual events of great hydrologic and geomorphic significance, the number of case studies are surprisingly limited (Gupta, 1998).

According to Malawi severe floods have affected about a million people and claimed 56 lives. Between 1946 and 2013, floods accounted for 48 percent (48%) of major disasters and their frequency and severity is increasing.

They have occurred in 16 out of the country's 28 districts, in both rural and urban areas. The lower Shire Valley in southern Malawi, bordering Mozambique composed of Chikwawa and Nsanje districts is the most flood prone and most affected area.

There are several causes of floods but one of the major reasons for floods in Malawi is rainfall characteristics, as rainfall is variable, erratic and rainfall in highlands often causes floods in the low-lying areas. Extensive deforestation also increases runoff and overall flood risk. Floods stifle development efforts at every level. They affect many sectors from agriculture to sanitation, environment and education. The combined effects of floods and droughts cause losses at least 1.7 percent (1.7%) of country's Gross Domestic Product (GDP) annually. Due to food shortages and higher domestic prices, the national poverty headcount rate increases by almost 1 percent (1%) each year (R. Sakic Trogrlic, 2019).

Malawi experienced normal to above normal rainfall within most of its regions. Karonga district, which is located in the Northern Part of the country and is situated in the rift valley basin which makes it prone to several number of disasters like earthquake, flooding and storms. It lies on the northern shore of Lake Malawi and commonly it experiences flooding in the months February and March. It has received above normal rainfall mid-March which resulted in extensive flooding in most of the district. The flooding resulted in infrastructural damage as well as displacement of families in the affected communities.

The displaced families were evacuated to nearby schools where camps were set up for them to stay until the water subsided. A total number of 8,286 households (55,921 people) were affected by the flooding.

About 665 houses collapsed whilst others were partly damaged. Most of the collapsed houses were semi-permanent structures. The affected households comprised of 4,759 farming families (2,974 male-headed households and 1,785 female-headed households).

The remaining 3,527 households included those whose houses had been damaged partially. Of the affected population, 4,467 were children under-five years, 385 elderly people, 261 orphans and 15 people living with disabilities. Sequel to this impact, the MRCS with support from the International Federation of Red Cross (IFRC) launched a DREF for CHF 223,930 on 9 May 2017 to support the NS to conduct an initial rapid needs assessment, while support mainly focused on ensuring that the vulnerable communities have increased access to appropriate and sustainable water, sanitation and hygiene. It was also aimed at ensuring that communities in disaster and crisis affected areas restore and strengthen their safety, wellbeing and longer-term recovery through shelter and settlement solutions (IFRC, 2017).

Not only that the research done by S M Kamrul Hassan (2019) on the impacts of floods on rice production of Bangladesh was also conducted and another research conducted by N. Ngwira (2007) on floods in Iponga area, Karonga district on causes, impacts and coping strategies of floods specifically on social-economic impacts.

CHAPTER 1: LITERATURE REVIEW

INVESTIGATING THE IMPACTS OF FLOODS ON RICE PRODUCTION A LONG SONGWE RIVER.

1.1 FLOODS WORLDWIDE

Occurrence of floods is a natural phenomenon and man has to live with it right from the beginning. It is not just confined to monsoon in Asia but it is a globally pervasive hazard (Kale, 1998). Floods have ravaged portions of India from time immemorial but their impact was not felt earlier, since the floodwaters would spread over vast open countryside which was sparsely occupied. Floods can occur in many ways, usually in valley bottoms and coastal areas and be produced by a number of influencing conditions. Their locations and magnitudes vary considerably and as a result they have markedly different effects upon the environment.

The continent of Africa comprises 54 states, and its climatic conditions are incredibly diverse, ranging from equatorial to desert. Rainfall and river flows in Africa show high levels of variability across a range of spatial and temporal scales (Conway et al., 2009; Hamandawana, 2007; Laraque, Mahé, Orange, & Marieu, 2001; Sutcliffe & Knott, 1987). This poses several complex challenges for the management of floods on the continent.

These range from estimating extreme flood flows in ungauged catchments in arid zones in North Africa and managing flood regimes in large, transboundary river basins such as the Niger and Zambezi to reducing the vulnerability to floods of the 238 million people in sub-Saharan Africa who live in informal settlements (United Nation [UN], 2019). Based on the number of people affected, over the past 30 years, floods and droughts are the two natural hazards that have the largest humanitarian impacts in Africa (Lumbroso, Brown, & Ranger, 2016).

However, in the past decade, across Africa, floods have overtaken droughts in terms of the number of people that they impact. The 2018–2019 South-West Indian Ocean cyclone season resulted in a level of flood damage previously unseen in Africa (Masters, 2019).

The main cause was Cyclone Idai, which primarily affected Mozambique and Zimbabwe. It commenced in March 2019 as a tropical depression over Malawi, which caused widespread flooding, affecting almost 1 million people. This moved back out to sea, forming Cyclone Idai, which hit the east coast of Mozambique before dissipating in eastern Zimbabwe (Masters, 2019).

The storm resulted in at least 602 deaths in Mozambique, 299 fatalities in Zimbabwe (Centre for Research on the Epidemiology of Disasters, 2019), and caused damage to critical infrastructure estimated to be $1 billion (Hillard, 2019).

Floods result from a number of basic causes. Excessively heavy and / or excessively prolonged rainfall is the most common universal cause of floods. Although in cold winter areas where snowfall accumulates on the surface, substantial flooding frequently occurs during the period of melt in spring and early summer, particularly when melt rates are high. In many snow-covered areas floods result from the effects of rain falling on to an already decaying and melting snowpack.

Heavy rainfall is the main cause of floods in Indian rivers during monsoon months. Rivers of northeast India and North Indian Plains are more prone to floods and there are two sites in northeast India, viz., Dibrugarh on the Brahmaputra River and Road Bridge site on the Beki River, which are the worst flood-hit sites of the country as they experience highest number of floods year after year. (Dhar and Nandargi, 1998). Floods have been occurring almost each and every year in different parts of the country.

On an average per year, about 78 lakh hectares of land has been affected by the ravages of floods and the average flood season cost was estimated to be of the order of 240 crores of rupees (Verma, 1978).

In India, generally floods occur during the four monsoon months of June to September. According to the various causes, floods are of various types like flash floods, single event floods, coastal floods, floods caused by dam failures and estuarine floods etc. Floods depend on the morphology and operation of fluvial systems.

The combined effect of these two variables controls the sensitivity of fluvial landforms to change during floods and the stability and permanence of flood-created fluvial morphology. According to Kochel, the permanence of flood – generated landforms is one criterion that can be used to measure the geomorphic significance of a flood event.

Climate and landscape determine the relative magnitude of the flood event itself. In view of the severe impact of floods on human society, many serious attempts have been made worldwide, including India, to improve the scientific understanding of the flood phenomenon. In India, where floods are major annual events of great hydrologic and geomorphic significance, the number of case studies are surprisingly limited (Gupta, 1998).

1.2 FLOODS IN MALAWI

Severe floods in Malawi have affected about a million people and claimed 56 lives. Between 1946 and 2013, floods accounted for 48 percent (48%) of major disasters and their frequency and severity is increasing.

They have occurred in 16 out of the country's 28 districts, in both rural and urban areas. The lower Shire Valley in southern Malawi, bordering Mozambique composed of Chikwawa and Nsanje districts is the most flood prone and most affected area.

There are several causes of floods but one of the major reasons for floods in Malawi is rainfall characteristics, as rainfall is variable, erratic and rainfall in highlands often causes floods in the low-lying areas. Extensive deforestation also increases runoff and overall flood risk.

Floods stifle development efforts at every level. They affect many sectors from agriculture to sanitation, environment and education. The combined effects of floods and droughts cause losses at least 1.7 percent (1.7%) of country's Gross Domestic Product (GDP) annually. Due

to food shortages and higher domestic prices, the national poverty headcount rate increases by almost 1 percent (1%) each year (R. Sakic Trogrlic, 2019).

1.3 FLOODS IN KARONGA

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It was also aimed at ensuring that communities in disaster and crisis affected areas restore and strengthen their safety, wellbeing and longer-term recovery through shelter and settlement solutions (IFRC, 2017).

1.4 STUDY RATIONALE

According to literatures from various areas have investigated the impacts of drought and floods on Agriculture in general in Malawi and the causes, impacts and coping strategies of floods and not specifically on the impacts of floods on rice production in Malawi and due to this this study will try to investigate and analyze the impacts of floods on rice production a long Songwe river in Karonga district.

2. CHAPTER 2

2.1 RESEARCH OBJECTIVE

To investigate the activities that contribute to flooding, impacts and possible solutions of floods on rice production a long Songwe River.

2.2 SPECIFIC OBJECTIVES

The study specifically will seek to fulfill the following:

i. To find out activities that contribute to flooding in the area
ii. To identify the impacts of floods on rice production in the area
iii. To identify mitigation measures on the negative impacts of floods on rice production

CHAPTER 3

3.0 METHODOLOGY

3.1 STUDY TYPE

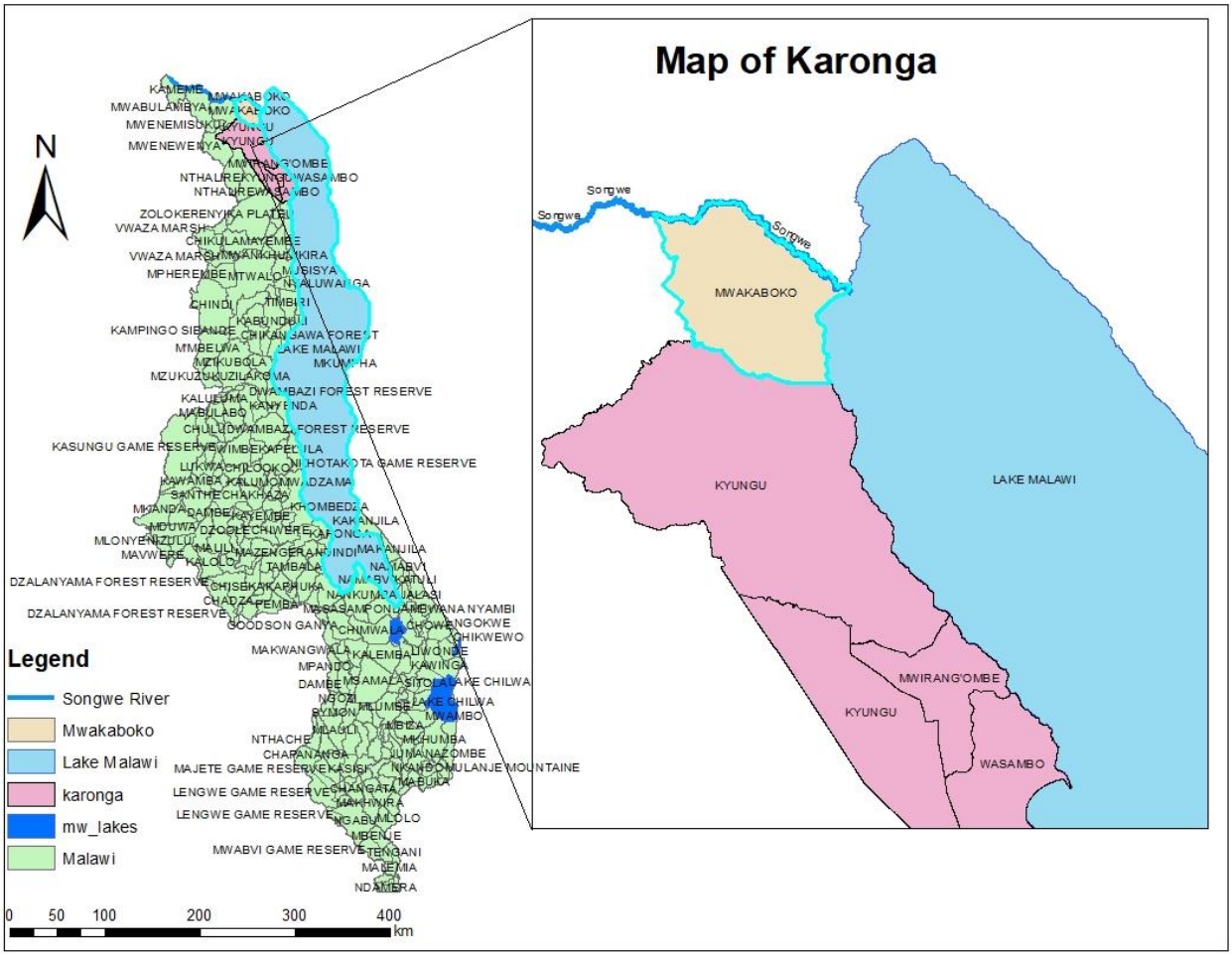
This study is qualitative.

3.2 STUDY SITE

The Songwe River forms the border between Malawi and Tanzania. This river is one of the major rivers in Malawi. It flows southeast to empty into Lake Malawi. Severe watershed degradation continues to occur in the tropical regions of southern Africa. This has raised interest in harness and manipulate the potential of watershed resources for human benefit as the population grow.

Songwe River is one such degrading watershed counting biennial flooding among other problems. The fact that it is situated in Karonga, it means it experiences flooding every rainy season and affects the rice production and other effects surrounding the communities.

Figure 1; The map below shows the study area:



Source: produced by ArcGIS

3.3 STUDY POPULATION

My study area situated in Traditional authority Mwakaboko in Karonga where the current total population is not known. The blocks, villages and households surrounding the study area, will be sampled by using a multistage stratified sampling method in order to be selected to avoid bias. The whole area will be divided into geographic clusters like near to the river, middle and far from the river strata.

From this technique sample size will be obtained from the target population which will be selected randomly by using the proportions of participants' formula below;

$n = Z^2(P)(1-P)/e^2$

where n= sample size, Z=value of normally distributed standard variate which states different values with a given confidence interval value, p=proportion of the participants with the attribute under study out of the total population in the study area and the value 0.5 was used for p ever since the population is unknown and e=is the allowable error or the desired level of accuracy, so in this case, the formula was calculated at 95% confidence interval, which gives 1.96 as the value of Z and an allowable error of 10%. By apply the formula above the sample size (n) was found to be 96.

According to the calculations above my study will use the sample size of 96.

3.4 RESULTS AND DISCUSSIONS

In this research data was collected by the means of a questionnaire where the participants were responding to the questions on the questionnaire and the data analysis has been done by software called SPSS as follows:

Table 1

Gender

		Frequency	Percent
Valid	Male	53	55.8
	Female	42	44.2
	Total	95	100.0

From the sample size of my study area 95 individuals participated in responding to the questionnaire presented to them and out of 95 individuals 53 were male representing 55.8 percent and 42 were male representing 44.2 percent as shown from the table 1 above.

Table 2

Marital status

		Frequency	Percent
Valid	Single	6	6.3
	Married	44	46.3
	Separated	16	16.8
	Divorced	14	14.7
	Widowed	15	15.8
	Total	95	100.0

From the table 2 above it shows that out of 95 participants 6 were single representing 6.3%, 44 married representing 46.3%, 16 separated representing 16.8%, 14 divorced representing 14.7% and 15 widowed representing 15.8%.

Table 3

Education level

		Frequency	Percent
Valid	Literacy	60	63.2
	Illiteracy	35	36.8
	Total	95	100.0

Table 3 shows that out of 95 participants 60 were literates representing 63.2% and 35 were illiterates representing 36.8%.

Table 4

Occupation

		Frequency	Percent
Valid	Farming	77	81.1
	Employment	11	11.6
	Others	7	7.4
	Total	95	100.0

From the table 4 above out of 95 participants 77 were farmers representing 81.1%, 11 employed representing 11.6% and 7 do other activities like businesses and so forth which represent 7.4%.

Table 5

Grow rice

		Frequency	Percent
Valid	Yes	80	84.2
	No	15	15.8
	Total	95	100.0

Table 5 shows that 80 participants grow rice representing 84.2% and 15 do not grow rice representing 15.8% respectively.

Table 6

Farms proximity to the river

		Frequency	Percent
Valid	Near	51	53.7
	Middle	30	31.6
	Far	14	14.7
	Total	95	100.0

From the table 6 above 51 participants live near the river representing 53.7%, 30 live at least some distance from the river, which is indicated as middle on the table representing 31.6% and 14 live far from the river representing 14.7%.

Table 7

Years

		Frequency	Percent
Valid	<5	20	21.1
	5-10	25	26.3
	>10	47	49.5
	do not know	3	3.2
	Total	95	100.0

The table 7 above shows that 20 participants have stayed in an area for less than 5 years representing 21.1%, 25 have lived between 5-10 years representing 26.3%, 47 have lived for more than 10 years representing 49.5% and 3 do not even know how long they have lived in that area representing 3.2%.

Table 8

Variation in rice production

		Frequency	Percent
Valid	High	2	2.1
	Medium	31	32.6
	Low	26	27.4
	very low	16	16.8
	Total	75	78.9
Missing	System	20	21.1
Total		95	100.0

From the table 8 above 2 participants responded they yield high production representing 2.1%, 31 responded to medium production yields representing 32.6%, 26 responded to low yields production representing 27.4%, 16 responded to very low yields production representing 16.8% and 20 represent those who don't grow rice representing 21.1% respectively.

3.4.2 Activities that contribute to flooding

1. Natural activities

i. Heavy rains

Table 9

Heavy rains

		Frequency	Percent
Valid	Yes	95	100.0

According to the table 9 above 95 of participants responded yes to heavy rains representing 100%. This is so because of climate change which has resulted to global warming and the area is subjected to heavy rains in recent years and this is according to ancient or old settlers (those who have lived >10 years) as compared to the past years.

ii. Overflowing rivers

Table 10

Overflowing river

		Frequency	Percent
Valid	Yes	94	98.9
	No	1	1.1
	Total	95	100.0

Here 94 participants responded yes to overflowing of the river representing 98.9% and only 1 said no representing 1.1% respectively. This is so because the river itself is not too deep these days as compared to the past years, as the river bed is now filled up with sand, mud and other debris from both highlands and eroded from other nearby farms. All these make the river not able to accommodate the water from highlands and other tributaries, hence it overflows and cause flooding to the area and affects rice production.

iii. Lack of vegetation

Table 11

Lack of vegetation

		Frequency	Percent
Valid	Yes	94	98.9
	No	1	1.1
	Total	95	100.0

From the table 11 above the response was similar to heavy rains. This is so because along the river there is less vegetation that can act as a break and reduce the speed of water run-off and increase infiltration.

iv. Channels with steep sides

Table 12

Channels with steep sides

		Frequency	Percent
Valid	Yes	2	2.1
	No	93	97.9
	Total	95	100.0

Table 12 above only 2 participants responded yes to channels with steep sides as a factor that contribute to flooding representing 2.1% and 93 responded no to that representing 97.9% respectively. The river is too shallow to accommodate the rain water instead it overflows to the farms.

2. Human activities

i. Deforestation

Table 13

Deforestation

		Frequency	Percent
Valid	Yes	94	98.9
	No	1	1.1
	Total	95	100.0

From the above table 94 participants responded yes to deforestation as a factor that contribute to flooding representing 98.9% and only 1 said no representing 1.1% respectively. This is the case due to increase in human population size, as a result they cut down trees along the river to create farms to meet their demand through cultivation of various crops and even for construct of their houses and other infrastructures. This eventually leave the land bare and increase or accelerate flooding in an area.

ii. Poor agricultural practices

Table 14

Poor agricultural practices

		Frequency	Percent
Valid	Yes	62	65.3
	No	33	34.7
	Total	95	100.0

Here 62 participants responded yes to poor agricultural practices representing 65.3% and 33 responded no representing 34.7%. The poor agricultural practices which contribute to flooding are cultivating a long river banks, overgrazing and overstocking just to mention a few and these to leave the land bare and vulnerable to landslides or mass movements and flooding at greater extent.

3.4.3 Impacts of floods on rice production

i. Positive impacts

The area relies on floods mostly for them to grow rice more especially those who have their farms far from the river and they have reasonable yields according to them. Though like that but according to my observation floods are not important at all because the majority are facing a lot of challenges about it.

ii. Negative impacts

Generally floods leave remarkable memories to those have their farms close to the river and good percentage of farms are located near to the river that is 53.7% of the participants, have low rice yield production, reduction of their farm sizes as most of the farms are filled up by sand from the river and those farms are abandoned, disruption of social-economic and livelihoods of people in the area, farmers are affected psychologically as their crops are destroyed by floods and poor quality of rice. Apart from that there are also a secondary impact like waterborne diseases like cholera and dysentery are common in the area and even shortage of food due to low yields.

3.4.4 Possible solutions on the negative impacts of floods on rice production

i. Construction of dyke/dam

Table 15

Construction of dyke/dam

		Frequency	Percent
Valid	Yes	38	40.0
	No	57	60.0
	Total	95	100.0

From the table 15 above 38 participants responded yes to the dyke/dam construction representing 40.0% and the other 57 responded no representing 60.0%. Here it shows that good percentage of the population is not supporting the idea of dyke/dam construction

because most of them could give reasons like dyke/dam will block the flooding water to cultivate rice as it does well in waterlogged areas.

This is the emphasis of those who have their farms far and very far from the river as they depend on the overflowing of the river to cultivate their crops more especially rice and have reasonable yields.

ii. Planting other flood-resistant crops

Table 16

Planting other flood-resistant crops

		Frequency	Percent
Valid	Yes	29	30.5
	No	66	69.5
	Total	95	100.0

The idea of planting other flood-resistant crops was strongly disagreed by the majority as an alternative the rice failure, as 66 participants responded no representing 69.5% and the remaining 29 said yes representing 30.5%. This shows that most people here depend on rice production as their main crop.

iii. Agricultural diversification

Table 17

Agricultural diversification

		Frequency	Percent
Valid	Yes	94	98.9
	No	1	1.1
	Total	95	100.0

In most cases agricultural diversification becomes the only choice and solution to the hazards that affect agricultural sector. This is also proven true in this area as almost all participants responded yes to it, which represent 98.9% from the table 17 above. Other forms of farming like animal farming, growing of other crops both food and cash crops, fish farming are recommended by the participants in area. In so doing most of the people will have a good capacity to the adverse impacts of floods. The other diversity which can be recommended in this area is by covering their farms through insurance companies against floods.

iv. Improving rice varieties

Table 18

Improving rice varieties

		Frequency	Percent
Valid	Yes	95	100.0

Here is another alternative to rice failure or low rice production yields as supported by all the participants representing 100%, the improvement of rice varieties. Most of the farmers in this area grow varieties like kilombero, faya, pusa, tayito ten, singa just to mention a few, which are very susceptible to floods because they take long time in the field almost 90 days before harvesting hence are victims of floods and lead to low or no yield production. The idea of improving these varieties can serve the purpose of taking few days almost 60 days in the fields and harvested before flooding period which is usually in early April. This can be achieved through mainstreaming agricultural sector as one of the clusters and through it, they can engage in their research stations in disaster risk management programs to produce improved rice varieties and those that are resistant to flood hazards at the same time.

v. Afforestation/re-afforestation

Table 19

Afforestation /re-afforestation

		Frequency	Percent
Valid	Yes	82	86.3
	No	13	13.7
	Total	95	100.0

The idea of afforestation/ re-afforestation was also strongly agreed by the majority as 82 participants responded yes to it representing 86.3% and those who opposed it were 13 representing 13.7% as shown from the above table 21. This can be achieved if the government can come up with a policy and this policy should be called "river restoration policy", where guidelines should be clear and understandable to the participants in various communities.

The policy should state that no one from today onwards should cut, clear and cultivate 25-30 meters away from the river banks and if does so should dance to the tune by bring the person before court and prove him/her guilty and charge a fine or detain the offender and I believe by and by people will get used to it.

One thing has been noticed is the planting of bamboos as one of the indigenous knowledge along the river banks, these plants are not easily washed away and make the stream maintain its course. This can be achieved by strengthening the civil protection committees more especially the District Civil Protection Committees (DCPCs), Area Civil Protection Committees (ACPCs) and Village Civil Protection Committees (VCPCs) so that they become more committed in carrying out their roles and responsibilities. And more especially the VCPCs there is need of some review and revisions of the Disaster Relief and Preparedness Act of 1991, so that VCPC members should not be drawn on voluntary basis they should rather be employed so that they should be committed in enforcing the policy.

Vi. Good agricultural practices

Table 20

Good agricultural practices

		Frequency	Percent
Valid	Yes	95	100.0

This solution to the adverse impacts of floods on rice production was 100% agreed by all the participants in an area as shown from the table above. This can be achieved by following proper agricultural measures like avoiding overgrazing due to overstocking, and even avoiding cultivating a long river banks which the serious case in the area by applying the earlier mentioned policy.

4.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

4.1 INTRODUCTION

The overall aim of this study was to investigate the impacts of floods on rice production a long Songwe river in Karonga district. Where field data collection was conducted to achieve the desired objectives of this study.

With the reference to the aim and specific objectives of this study the following are some summary conclusions.

4.2 SUMMARY CONCLUSIONS

From chapter one of this thesis, a literature review on impacts of floods in some parts of the world, including Malawi was conducted. The review identified key knowledge gaps in the context of impacts of floods on rice production and this led to the assessment of impacts of floods on rice production along Songwe river in Karonga district. The following are general conclusions based on the specific objectives of this study.

To find out activities that contribute to flooding in the area;
The objective was formulated based on the hypothesis that various places have different activities that contribute to flooding, according to the study area the following activities contribute to the flooding every rainy season and are divided into two parts. The first one is natural activities which include heavy rainfall, overflowing of rivers, lack of vegetation and channels with steep sides and the other one is human activities which include, deforestation and poor agricultural practices. The findings revealed that all the activities have greater contributions in the cause of flooding in that area.

To identify the impacts floods on rice production in the area;
According to the study there are two folds of impacts that is to say the positive impacts of flooding as the research found out that many people there depend on flood water for them to grow their rice.

On the negative impacts there are many and some of them are low rice yield production, reduction of their farm sizes as most of the farms are filled up by sand from the river and those farms are abandoned, disruption of social-economic and livelihoods of people in the area, farmers are affected psychologically as their crops are destroyed by floods and poor quality of rice. Apart from that there are also secondary impacts like waterborne diseases like cholera and dysentery are common in the area and even shortage of food due to low yields.

Possible solutions on the negative impacts of flooding on rice production;
There are many solutions required to solve this problem but this research has found out some few of them which are very easy to follow and implement, channel improvement is their most priority solution, the second one is good agricultural practices, afforestation or re-afforestation, agricultural diversification and planting other flood-resistant crops. The other one which is important too but greatly opposed by the majority is construction of a dyke or dam.

4.3 RECOMMENDED INTERVENTIONS

According to the findings of this study, the following are recommended interventions:

- The improvement of the river channel and this can be done in two ways, the first one is through government or other non-governmental organizations to provide fund, equipment and expertise to remove the debris which is accumulated in the river which make the river to be very shallow hence flooding through digging or excavating from source to the mouth of the river. The other one is through practicing good agricultural activities and afforestation and this can be achieved if the government can come up with a policy and this policy should be called "**river restoration policy**", where guidelines should be clear and understandable to the participants in various communities.
- The policy should state that no one from today onwards should cut, clear and cultivate 25-30 meters away from the river banks and if does so should dance to the tune by bring the person before court and prove him/her guilty and charge a fine or detain the offender and I believe by and by people will get used to it.
- One thing has been noticed is the planting of bamboos as one of the indigenous knowledges along the river banks, these plants are not easily washed away and make the stream maintain its course. This can be achieved by strengthening the civil protection committees more especially the District Civil Protection Committees (DCPCs), Area Civil Protection Committees (ACPCs) and Village Civil Protection Committees (VCPCs) so that they become more committed in carrying out their roles and responsibilities. And more especially the VCPCs there is need of some review and revisions of the Disaster Relief and Preparedness Act of 1991, so that VCPC members should not be drawn on voluntary basis they should rather be employed, so that they should be committed in enforcing the policy.
- There is need to raise awareness first for the policy called river restoration in the community so that they should be fully acknowledged and for easy acceptance because

some of their field portions will be taken up to meet the required distance from the river.

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APPENDIX

RESEARCH PROPOSAL QUESTIONNAIRE

This questionnaire has been developed by the researcher with an aim of obtaining data which will help in writing a dissertation in partial fulfillment of the requirements for the award of the Bachelors of Science Degree in Disaster Risk Management of Malawi University of Science and Technology. The aim of this study is to investigate the impacts of floods on rice production a long Songwe river in Karonga district and the data collected will remain confidential and will be used solely for the production of research project.

INSTRUCTIONS:

1. Do not write in your name in this questionnaire
2. Tick in the appropriate box for the questions that is demanding that
3. For the questions which require you to explain write in spaces provided and please be direct and to the point.

PART A: PERSONAL INFORMATION

I. Name
_____
_____

II. Gender/Sex M ☐ F ☐

III. Marital Status
- Single ☐ Married ☐ Separated ☐ Divorced ☐ Widowed ☐

IV. Level of Education
- Literacy/Illiteracy ☐ ☐

V. Occupation
- Farming ☐ Employment ☐ Others ☐

PART B: RICE PRODUCTION

I. Do you grow rice?

Yes/No ☐ ☐

- If yes, how many hectares? _____

II. Farms proximity to the river

- Near ☐ Middle ☐ Far ☐

III. Number of years lived in an area

- <5 yrs ☐ 5-10 yrs ☐ >10 ☐ do not know ☐

IV. Rice production variation since flooding

- High ☐ Medium ☐ Low ☐ Very low ☐

PART C: RESEARCH QUESTIONS

ACTIVITIES THAT CONTRIBUTE TO FLOODING SECTION

1. NATURAL ACTIVITIES

I. Heavy rains

Yes/No ☐ ☐

II. Overflowing rivers

Yes/No ☐ ☐

III. Lack of vegetation

Yes/No ☐ ☐

IV. Channels with steep sides

Yes/No ☐ ☐

2. HUMAN ACTIVITIES

A. Deforestation

Yes/No ☐ ☐

B. Poor agricultural practices

Yes/No ☐ ☐

IMPACTS OF FLOODS ON RICE PRODUCTION

3. POSITIVE AND NEGATIVE IMPACTS

I. Are floods important to you?

Yes ☐

No ☐

i. If Yes give reasons……
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ii. If No give reasons……
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4. POSSIBLE SOLUTIONS ON THE NEGATIVE IMPACTS OF FLOODS ON RICE PRODUVTON

i. Construction of dyke/dam

Yes /No ☐ ☐

ii. Planting other flood-resistant crops

Yes/No ☐ ☐

iii. Agricultural diversification

Yes/No ☐ ☐

iv. Improving rice varieties

Yes/No ☐ ☐

v. Afforestation/re-afforestation

Yes/No ☐ ☐

vi. Good agricultural practices

Yes/No ☐ ☐