

**IMPACT OF FLOODS ON RURAL LIVELIHOODS OF PEOPLE RESIDING IN
FLOOD PRONE AREAS: THE CASE OF LUHONONO COMMUNITY IN THE
ZAMBEZI REGION OF NAMIBIA**

By

MASHEBE PERCY MASHEBE

(STUDENT NO: 2006067124)

**Submitted in partial fulfilment of the Requirements for the degree
Master in Disaster Management**

In the

Disaster Management Training and Education Centre for Africa

At the

UNIVERSITY OF THE FREE STATE

Study Leader: DR. ANDRIES JORDAAN

2015

Declaration

I, Mashebe Percy Mashebe, declare that this mini-dissertation hereby submitted for the MASTER'S DEGREE in DISASTER RISK MANAGEMENT at the Faculty of Natural and Agriculture Sciences, University of the Free State, is my own independent work and that I have not previously submitted this work for a qualification at another university.

STUDENT'S NAME: Mashebe Percy Mashebe

STUDENT'S SIGNATURE: DATE:

Acknowledgements

In the first place, I would like to thank our mighty God for giving me strength, wisdom and capacity to carry out this research. Secondly, I would like to offer my great thanks to Dr Andries Jordaan, my supervisor, for his strong support, guidance and continuous encouragements throughout the process of this research. Thirdly, I would like to thank the traditional leaders of the Luhonono area for allowing me to collect data in their area without any form of difficulties. Fourthly, I would like to thank the Katima Mulilo Campus Director, Dr B. Kangumu, and the Deputy Dean, Dr C. Chata, for their support in allowing me to carry out the field work for this research. Finally, I would like to thank my wife, Meshelle, my two daughters, Lisa and Jerrelyn, and my son, Percy Junior, for their support during the time when I was away at times working on this project.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	vi
LIST OF TABLES	vii
ABSTRACT	viii
KEYWORDS	viii
DEFINITION OF TERMS	ix
LIST OF ACRONYMS	xi
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Description of Study area	2
1.2.1 Location	2
1.2.2 Climate.....	4
1.2.3 Topography and soil type	5
1.2.4 Vegetation.....	5
1.2.5 Socio-economic activities.....	6
1.3 Problem statement	6
1.4 Conceptual Framework.....	7
1.5 Research objectives	8
1.5.1 Sub-objectives	8
1.6 Null hypotheses	8
1.7 Significance of the study	8
1.8 Scope of the study.....	9
1.9 Outline of the report	9
1.10 Conclusion.....	10
CHAPTER 2 THEORETICAL FRAMEWORK	12
2.1 Introduction	12
2.1.1 The Sustainable Livelihood Approach (SLA) model	13
2.1.2 Livelihood capital assets.....	14
2.1.3 Vulnerability context	17
2.1.4 Livelihood strategies.....	17
2.1.5 Livelihood outcome	17
2.2 Pressure and Release (PAR) model	18

2.2.1	Root Causes of Vulnerability	19
2.2.2	Dynamic pressures.....	20
2.2.3	Unsafe conditions	20
CHAPTER 3 LITERATURE REVIEW.....		22
3.1	Introduction	22
3.2	Overview of floods as a natural disaster.....	22
3.3	Types of Floods	25
3.3.1	Riverine floods	25
3.3.2	Flash floods.....	26
3.4	Flood characteristics	27
3.5	The impact of floods on the livelihoods of people	28
3.6	Causes of Flooding	30
3.7	Positive impacts of floods.....	32
3.7.1	Different vulnerabilities and impacts to flooding.....	33
3.7.1.1	Economic Impacts (Direct and Indirect)	34
3.7.1.2	Social Impact (Direct and Indirect)	35
3.7.1.3	Environmental Impact (Direct and Indirect)	36
3.7.2	Coping or resilience against flooding	37
3.8	Economic Benefits of Flood.....	38
3.8.1	Lessons learnt from other Flooding Globally.....	40
3.8.2	Lessons learned from 1993 flood of the upper Mississippi River basin	42
3.8.3	Best Practices from other areas globally in Disaster Management	43
3.9	Root causes of Community Vulnerability to flood.....	44
3.10	Flooding in study area	45
3.11	Local knowledge on flood-related issues	47
3.12	Namibia National Disaster Risk Management Plan (NDRMP), 2011	48
3.13	Namibia Disaster Risk Management Act, 2012	50
3.14	What Government of Namibia did/did not do with regard to floods ..	51
3.15	Summary.....	52
CHAPTER 4 RESEARCH DESIGN AND METHODOLOGY		53
4.1	Introduction	53
4.2	Nature of the study	53
4.3	Study population.....	53
4.4	Sampling Method and sample size	54
4.4.1	Research Instruments.....	55

4.4.1.1	Structured Questionnaire	55
4.4.1.2	Interview guide	55
4.5	Data Analysis.....	56
4.6	Limitations.....	56
4.7	Ethical Considerations	57
4.8	Conclusion	57
CHAPTER 5 RESULTS, INTERPRETATION AND DISCUSSION		58
5.1	Introduction	58
5.2	Research Findings and Presentation	58
5.2.1	Demographic characteristics of the respondents	58
5.2.2	Literacy	60
5.2.3	Age Analysis.....	61
5.2.4	Severity	63
5.2.5	Relocation to other high areas	70
5.2.6	Coping strategies used by affected villages.....	73
5.2.7	Government efforts in reducing the effects of flood	75
CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS.....		79
6.1	Conclusions	79
6.2	Recommendations	81
REFERENCES		84
APPENDICES.....		95
Appendix 1: Household Introduction and Questionnaire		95
Appendix 2: Key-informant Introduction and Interview guide.....		102

LIST OF FIGURES

Figure 1.1 Map of Zambezi Region.....	2
Figure 1. 2 Eastern Floodplains of the Zambezi Region	3
Figure 1.3 Kabbe Constituency	3
Figure 2.1 Sustainable Livelihood Framework	13
Figure 2.2 Pressure and Release (PAR) model – Progression of Vulnerability Flood Hazard in Luhonono Area (Own Designed).....	19
Figure 3.1 Zambezi River Levels: Year and highest level reached.....	23
Figure 3.2 Total rainfall per season in the upper catchments of Zambezi River.....	24
Figure 3.3 Monthly rainfall distribution in Zambezi region.....	24
Figure 3.4 Waterlogged Villages in the Zambezi region soon after heavy rainfalls resulted in flash flooding	27
Figure 3.5 Picture of young people carrying fish that were caught from the flood water in the Northern part of Namibia	39
Figure 3.6 A village in Kabbe constituency in the Zambezi Region, submerged in floodwater in March 2008:	46
Figure 3.7 A school in Northern Namibia submerged in flood	47
Figure 5.1 Distribution of literacy rates of households in Luhonono area	61
Figure 5.2 Overall age distribution of the respondents	63
Figure 5.3 Respondents’ opinions on selected issues.....	78

LIST OF TABLES

Table 5.1 Demographic distribution of respondents and statistics	59
Table 5.2 Distribution of household size in Luhonono area.....	60
Table 5.3 Age distribution of the households in Luhonono area.....	62
Table 5.4 Observed values of effects on households.....	63
Table 5.5 Expected values (relative overall effect)	64
Table 5.6 Relative effects	66
Table 5.7 Observed values.....	67
Table 5. 8 Effect of flood.....	69
Table 5.9 Distribution of responses of respondents with regard to relocation	72
Table 5.10 Distribution of respondents according to their coping strategies	74
Table 5.11 Distribution of respondents' opinions on selected issues.....	77

ABSTRACT

This study examined the impact of floods on the livelihoods of the community of the Luhonono area, formerly Schuckmannsburg, in the Kabbe constituency in the Zambezi region of Namibia. The problem identified is the persistent flooding in the Luhonono area, giving rise to the need to examine the impact of floods on the livelihoods of the local community. The study employed both qualitative and quantitative approaches, utilising both descriptive and exploratory designs. The target population for the study was all the heads of households, community leaders and political councillors of government in Luhonono area. The study applied both purposive sampling and simple random sampling techniques. Purposive sampling was used to select three, information-rich key informants; the area Headman, the Councillor and the Community Development Committee member (CDC). A simple random sampling technique was used to choose a sample of 169 participants from a total of 800 households in the area. Structured questionnaires and an interview guide were used as research instruments to collect the data from the sample. The data collected was computed using the Excel computer program and the data was analysed by both qualitative and quantitative techniques. *Chi Square* tests were carried out to determine the association of villages and severity of the flooding to the respondents. Hypotheses to test this association were examined using the *Chi Square* method. It was established that there is no association between the villages and the overall severity of the floods in the Luhonono area. This implies that all the villages were equally affected by the flood. On the other hand, the results of the study showed that floods impacted more severely on one or more of the crops, livestock, water quality, child education, livelihoods and dwellings. The results have shown that crops and child education were the most affected. The study further recommended that the Government of the Republic of Namibia should step up the relocation drives (considering the willingness of the affected people), linked to positive incentives which would be a long-term solution, unlike the temporary provision of utilities during times of flooding.

KEYWORDS

Disaster, Flood, Hazard, Preparedness, Resilience, Vulnerability, Pressure and Release Model, Livelihood, Luhonono, Namibia.

DEFINITION OF TERMS

“Capacity – resources, means and strengths which exist in households and communities and which enable them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster” (Dey & Singh, 2006, p. 6).

“Disaster – a serious disruption in the functioning of the community or society causing wide spread material, economic, social or environmental losses which exceed the ability of the affected society to cope using its own resources” (Dey & Singh, 2006, p. 3) and (Reliefweb, 2008, p. 22).

“Disaster risk reduction – action taken to reduce the risk of disaster and adverse impacts of natural hazards, through systematic efforts to analyze and manage the causes of disasters, including through avoidance of hazards, reduced social and economic vulnerability to hazards, and improved preparedness for adverse events” (RedR, 2013, p. 1) and (Reliefweb, 2008, p. 23).

“Disaster risk management – is the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters” (Reliefweb, 2008, p. 22).

“Disaster risk – the magnitude of potential disaster losses, in lives, livelihoods and assets, which could occur to a particular community or group, arising from their exposure to possible future hazard events and their vulnerability to these hazards” (Reliefweb, 2008, p. 22).

“Disaster risk reduction plans – a formal document set out by authority’s goals for risk reduction together with related sequences of action to accomplish stated objectives towards these goals” (Reliefweb, 2008, p. 23).

“Early warning system – is the set of capacities needed to provide timely and meaningful warning information to enable individuals and communities threatened by a hazard to act and prepare in appropriate manner to reduce the possibility of personal injury, loss of life and livelihoods, damage to property and the environment, and to prepare for effective response” (Dey & Singh, 2006, p. 24).

“Flash Flood – floods which occur within six hours of the beginning of heavy rainfall, and are usually associated with cloud burst, storms and cyclones requiring rapid localized warnings and immediate response to reduce damage” (Reliefweb, 2008).

“Flood – is a state of high water levels along a river channel or coast that leads to inundation of land, which is not usually submerged” (Dey & Singh, 2006, p. 30).

“Forecast – definite statement or statistical estimate of the occurrence of a future event” (Reliefweb, 2008, p. 27).

“Hazard – a dangerous condition or event, that threatens or has the potential for causing injury to life or damage to property or the environment” (Dey & Singh, 2006, p. 4).

“Mitigation – embraces measures taken to reduce both the effect of the hazard and the vulnerable conditions to it in order to reduce the scale of a future disaster” (Dey & Singh, 2006, p. 7).

“Natural hazard – natural process or phenomenon that may cause loss of life or injury, property damage, social and economic disruption, or environmental degradation” (Reliefweb, 2008, p. 40).

“Preparedness – encompasses those measures taken before a disaster event which are aimed at minimizing loss of life, disruption of critical services, and damage when the disaster occurs” (Dey & Singh, 2006, p. 7).

“Prevention – activities to provide outright avoidance of the adverse impacts of hazards and means to minimize related environment, technological and biological disasters” (Reliefweb, 2008, p. 43).

“Recovery – a focus on how best to restore the capacity of the government and communities to rebuild and recover from crisis and to prevent relapses into conflicts” (Reliefweb, 2008, p. 45).

“Risk – is a measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazardous events and the losses each would cause” (Dey & Singh, 2006, p. 6).

“Resilience – the capacity of the system, community or society potentially exposed to hazards to resist, adapt and recover from hazard events, and to restore an acceptable level of functioning and structure” (Reliefweb, 2008, p. 47).

“Vulnerability – the extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the particular hazard, on account of their nature, construction and proximity to hazardous terrains or disaster prone area” (Dey & Singh, 2006, p. 5).

List of Acronyms

ADPC – Asian Disaster Preparedness Center

APF – African Planning Forum

BARCIK – Bangladesh Resource Centre for Indigenous Knowledge

CBSE – Central Board of Secondary Education

CDC – Community Development Committee

CRED – Centre for Research on the Epidemiology of Disasters

DFID – Department for International Development

DRR – Disaster Risk Reduction

FDCL – Forschungs und Dokumentationszentrum Chile - Latinamerika

FEMA – Federal Emergency Management Agency

ICHARM – International Centre for Water Hazard and Risk Management

IFRC – International Federation of Red Cross

IISD – International Institute for Sustainable Development

NNDRMP – Namibia National Disaster Risk Management Plan

NDRMP – National Disaster Risk Management Policy

NSA – Namibia Statistics Agency

PAR – Pressure and Release

PoV – Progression of Vulnerability

SAIEA – Southern African Institute for Environmental Assessment

SLA – Sustainable Livelihood Approach

SPC – Stubenrauch Planning Consultants

UNDP – United Nations Development Programme

UNISDR – United Nations International Strategy for Disaster Risk Reduction

UN – United Nations

CHAPTER 1

INTRODUCTION

1.1 Introduction

The study investigated the impact of floods on the rural livelihood of people in the Luhonono area in the Zambezi Region of Namibia, formerly known as Schuckmannsburg. The main aim of this study while investigating the impact of floods on these communities was to determine the underlying root causes of the community's "*vulnerability*" to the annual floods. It is important to understand the destruction and disruption which floods may cause to the livelihood people (Wisner, et al., 2004). "*Flooding triggers and worsens poverty through loss of land and other assets*" (Wisner, et al., 2004, p. 205). It is also important to understand that in an area affected by flooding, it is unlikely that the flood would bring starvation to the community; however, it is essential note that floods usually affect the livelihoods of farmers, in particular those farming crops, and to a lesser extent, those rearing livestock (Wisner, et al., 2004).

In Namibia, the majority of people live in rural areas and this is also evidenced in most African countries, where the majority of the rural people largely depend basically on "*subsistence farming*" activities, such as cereal crop farming and vegetable practices (Purvis, 2002). It thus important to note that the damage to crop fields attributable to the general impact of flooding is a foremost stumbling block for the communities affected by floods, most importantly the poorest one (Wisner, et al., 2004). It is also essential to understand that because poverty is linked to people living in a communal environment, they tend to be more vulnerable to the different components that are associated with flood; this is because these people have fewer reserves which renders them more likely to be less resilient to flood impact. "*Poverty reduces resilience and recovery ability and capacity of the community during disaster*" (Grunfest, 1995).

1.2 Description of Study area

1.2.1 Location

Namibia is divided into fourteen (14) regions and the Zambezi region is one of the regions situated in the north-eastern part of the country (see Figure 1.1 below). “The Zambezi region is a strip between Angola in the north and Botswana in the south and borders with Zambia to the north-east. Zambezi region is located on latitude $17^{\circ}30'00''S$ and longitude $24^{\circ}16'00''E$ based on the World Geodetic System (WGS) 84 coordinate reference system. The area is blessed with arable land and sufficient rainfall (average annual rainfall varied between 550 mm and 700 mm which greatly ...” (Abah, et al., 2015, p. 30) increases the levels of flooding in the flood-prone areas (Open-Africa, 2014).

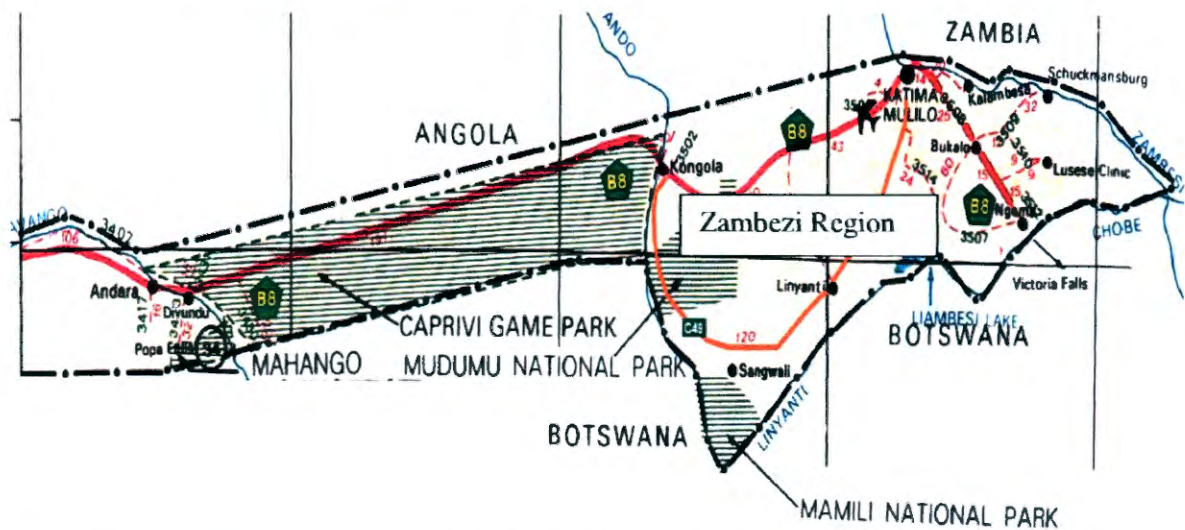


Figure 1.1 Map of Zambezi Region. Source: (Reliefweb.int/map/namibia/namibia-flooding, 2009)

The Zambezi region is divided into six constituencies (at the time of conducting this study), namely Kabbe, Katima Mulilo Urban, Katima Mulilo Rural, Kongola, Linyanti and Sibbinda (Jones & Dieckmann, 2013). The study was undertaken in the Luhonono area of Kabbe constituency (Figure. 1.3 below) in the Zambezi region of Namibia (Figure 1.2 below). Luhonono is located on latitude $17^{\circ}303'061''S$ and longitude $024^{\circ}48'861''E$.

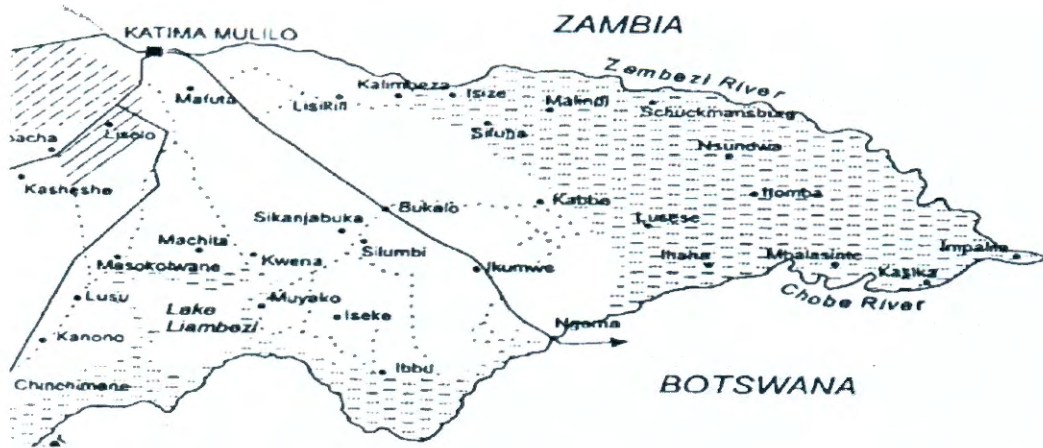


Figure 1.2 Eastern Floodplains of the Zambezi Region. Source: (Reliefweb.int/map/namibia/namibia-flooding, 2009)

Kabbe Constituency

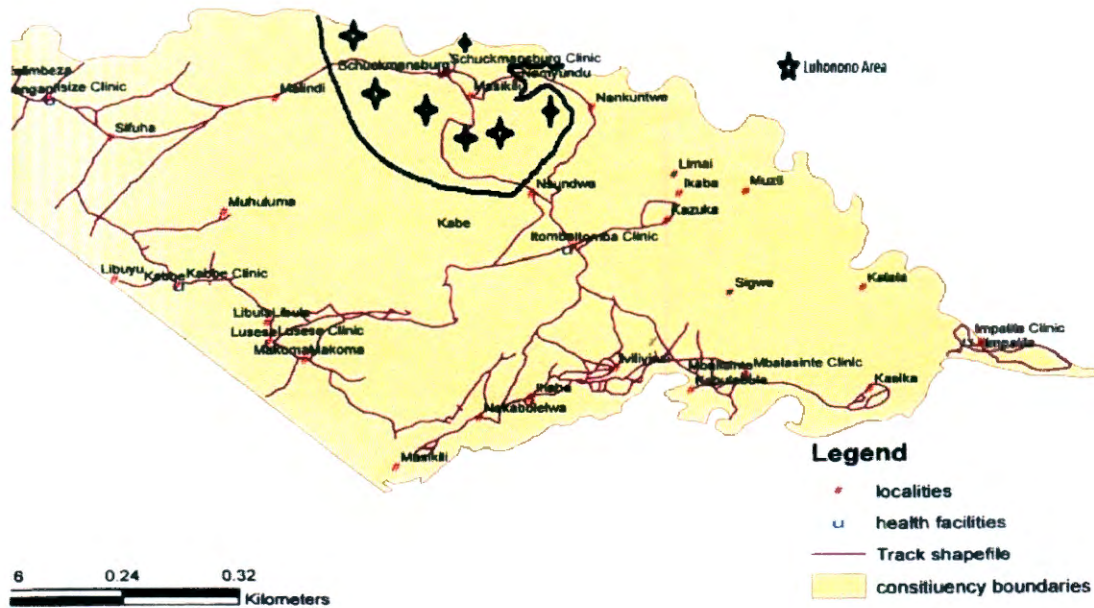


Figure 1.3 Kabbe Constituency: Source (Reliefweb.int/map/namibia/namibia-flooding, 2009)

The Kabbe constituency is in the eastern part of the Zambezi region, with much of its land being the low-lying swampy Zambezi plains dominated by old (informal) channels and grasslands, which are subject to seasonal flooding (Purvis, 2002). The Luhonono area was selected for this study because floods have become an annual phenomenon ever since immemorial (Republic-of-Namibia, 1998).

1.2.2 Climate

The climate of the study area is influenced by sufficient sunlight, with steady eastern wind flow, less evaporation, and high rainfall, and is much warmer than the rest of the country. This makes the study area an ideal place for most plants to flourish very well (Mendelsohn & Roberts, 1997). The area is characterised by a heavy rainfall season, from November to mid-April of the following year. The average rainfall is about 700 mm, with peak rainfall occurring in mid-December and early January in wetter periods; although during dry periods, the average rainfall at times measures below 300 mm for the entire rainfall season. In 1969, 1978 and 2009 (see Figures 3.1 and 3.2 below), the floods corresponded with the annual peak of rainfall input within the area and the upper catchments in Zambia. The records of mean temperature obtained from the meteorological station in the Katima Mulilo town, adjacent to the study area, indicates a range between 28 °C – 39 °C.

The climate of the study area can be categorised into two notable seasons: the dry season, between April and November, and the wet season, from November to early April. It is important to note that the rainfall in the study area is greatly inconstant. This inconsistency of the rainfall pattern of the study area has direct effects on the livelihoods of the communities in the study area. In certain periods this inconsistency exposes them to heavy flooding, and sometimes it exposes them to poor crop production and low grazing for their livestock (Mendelsohn & Roberts, 1997).

1.2.3 Topography and soil type

The topography is very low and plane in nature, making it more prone to flooding. The study area is relatively flat, making it more prone to floods. The landscape of the study area is shaped by the floodplains and the existing river channels (Mendelsohn & Roberts, 1997). The landscape of the study area is characterised by '*open water*', '*grassland*', '*river channels*' and '*floodplains*' (SPC, et al., 2015, p. 35). The soil type is predominantly sand, although the Fluvisol soil type is encountered, which is very rich in plant nutrients and quite suitable for crop production, but unfortunately this area is prone to flooding. The study area is characterised in parts by '*heavy clay*' soils which make it more difficult for the area to absorb water, and usually this leads to flooding. This soil is impervious, thus preventing water from draining downwards, and it then holds water over a long period (SPC, et al., 2015). However, in other parts, the study area is characterised by dense, pure sand soil, which is characterised by not holding water or moisture over a long period. It is also important to note that between these two continuums, there are transitional soil types, including '*loams, clay-loams, and sand clays*', and these transitional soil types are suitable for agriculture production, since these types of soils have the potential to retain sufficient water, and at the same time have sufficient plant nutrients (Mendelsohn & Roberts, 1997).

1.2.4 Vegetation

The vegetation consists predominantly of grassland, with patches of bushy, thorny plants, such as acacias species, and silver trees (Muhonono¹). It is thus important to note that the textural nature of the soil, its depth and the high nutrient content coinciding with the ability to hold water for over a long time, create a situation favourable for water vegetation, such as reeds and other types of grasses, that are more palatable to the taste of livestock. The vegetation type of the study area is characterised by open water, floodplains, silver tree woodland and grassland.

¹ A predominantly common plant species, from which the name Luhonono was derived. Muhonono is a Silozi name referring to Silver tree.

1.2.5 Socio-economic activities

Subsistence farming (29 %) and fishing (41 %) are the predominant livelihood strategies for the people in this area and “*this makes up the social wellbeing, demography and the economic status*” (SPC, et al., 2015, pp. 57-70) of the community. The majority of the people are engaged in cash crop farming (at a small scale), mainly on the Fluvisol soil type with limited application of external inputs, such as inorganic fertilisers. No irrigation systems are used in this area, with farmers rather practising only dry land farming. Cattle (but no goats, sheep and pigs) and chickens are evident in every village² throughout the whole Luhonono area. Sale proceeds from cattle and chicken provide extra income towards community members’ sustainability. It is thus important to note that the “*population density of the study area ranges between 8-8.1 persons/km²*” (SPC, et al., 2015, p. 58). The literacy rate is believed to be good – “*(about 85 % of the age group 15 years +*” (SPC, et al., 2015, p. 60).

1.3 Problem statement

More than 800 people live in the Luhonono area and the number is increasing each year (Republic-of-Namibia, 2009). The socio-economic activity of the people in the area is predominantly agricultural and fishing, comprising the largest occupational group of 41.7 % (Republic-of-Namibia, 2011). The study area is mostly situated in a low-lying area (and very close to the Zambezi River) which is very prone to flooding. Flooding in this study area is annual, owing to the overflow of the Zambezi River (Republic-of-Namibia, 2009). It is thus important to note that floods destroy crop fields, infrastructure, and wildlife environments, and in some cases, claim human lives (Purvis, 2002). This is the case with Luhonono area where nearly every year flooding causes displacement of people from their villages and disrupts their socio-economic activities, such as agriculture, education of children and access to health services, because access to and movement of the community is seriously affected. The main problem is the subsequent poverty which results from the effects imposed on farming activities: at most, crops are destroyed, while crops yields are reduced and settlements are devastatingly

² A village is considered as a place where a family is clustered. People in Luhonono area are clustered in villages, signifying their family basis. Every person found residing in that village is particularly a family member. However, the village will still accommodate other people from other families, upon request from the head of the village.

destroyed nearly every year (Purvis, 2002). Consequently, it is important to note that massive losses of crop fields and livestock because of flooding are apparent in the Zambezi region (Republic-of-Namibia, 2009). The annual floods that occur in the study area renders the installation of any type of capital project, such as roads, electricity supply, and other essential developmental projects, very problematic. The most essential projects, such as agricultural projects that might benefit the community from the good soil type in the study area, cannot be established owing to the annual flooding. In 2004, 3000 people were evacuated from the flooded areas of Luhonono with the assistance of the Defence Force from Zimbabwe (using helicopters) and more than 15 000 cattle were trapped and needed to be rescued. In 2014, over 100 learners who were in grade 10 in schools, such as Nankuntwe and Muzii (the school adjacent to Luhonono area), were relocated into makeshift classrooms at Cheshire Home about 4 kilometres east of Katima Mulilo (Webdesk, 2014). The flood inundated a huge area (UNICEF, 2004). Therefore, until such time as permanent solutions are implemented, the Luhonono area will remain predominantly a floodplain, where to a great degree not much infrastructure can be put in place.

Hence, it is with this background that this study was conducted in an effort to investigate the impact of flooding on rural livelihoods and to determine the root causes of vulnerability in the flood prone regions of Namibia, and the Luhonono area in particular.

1.4 Conceptual Framework

The model of sustainable livelihood and the PAR model afford a theoretical guide which is most applicable for this study. The livelihood approach provides the practical linkage that exists among households' 'assets' and undertakings, composed of the major roles of 'institutions' and 'regulations' processes on the edge of assets with activities leading to significant objectives (Oni, 2014) and (Christensen & Pozarny, 2008). The model of sustainable livelihood shows the motivation of shocks and trends on substantial symptoms like poverty and food security. "*Sustainable livelihood approach provides comprehensive but summarizing account of causes, indicators and measurements of poverty with a view to setting priority of action at an operational level*" (DFID, et al., 1999, p. 10).

1.5 Research objectives

The main objective of this study is to investigate the impact of floods in the Luhonono area of Kabbe constituency on the livelihoods of people affected by previous floods.

1.5.1 Sub-objectives

The following are the specific objectives of this study:

- To determine the impact of flooding on the livelihood of people living in the Luhonono area.
- To determine the role of the Government of the Republic of Namibia (GRN) in increasing community resilience to flooding.
- To determine the flood coping strategies of the community of the Luhonono area.

1.6 Null hypotheses

- H_0 : There is no association between the village and the overall severity of a flood – (That is, the severity of the floods was uniform across all villages).
- ❖ H_a : There is association between the village and the overall severity of the floods – (That is, the severity of the floods was most uniform across all villages).
- H_0 : The floods impacted equally severely between the crops, livestock, water quality, children education, livelihood and dwelling.
- ❖ H_a : The floods impacted severely in the crops, livestock, water quality, children education, livelihood or dwelling.

1.7 Significance of the study

Floods have been a cause for concern in the Zambezi region, mainly on the Zambezi flood plains of the Kabbe constituency. Therefore, the results of this study will contribute significantly and positively to the implementation of the existing policies and would

recommend workable new policies that will help to reduce community vulnerability to flood in order to improve the livelihoods of the affected people.

This study will also lay a foundation for other stakeholders who have interest in the area of disaster management to undertake further research into issues that may arise from this study. Since floods occur every year between February and July, high losses of crops, damages to properties, environmental degradation and losses of livestock are on an increase every year in Luhonono area. Finally, the study will help other researchers who wish to further their studies on the impact of floods on the livelihoods of people living in flood-prone areas.

1.8 Scope of the study

The study focuses on the social and economic welfare of people living in areas prone to flooding. The main focus is on the recurring floods and their impact on the socio-economic well-being of the affected populations. Since people living in the Luhonono area in Kabbe constituency are mainly subsistence farmers³ who mainly depend on the environment for their source of living, the occurrence of floods and their effects is a challenge which requires a study for identifying interventions. Therefore, the study endeavoured to formulate recommendations and mitigation strategies or measures that might help in managing the impacts of floods in a sustainable way.

1.9 Outline of the report

This mini dissertation is comprised of six chapters, as outlined below:

- **Chapter 1: Background to the Study**

This chapter presents the background and introduction to the study. It gives an understanding of the conceptual framework, and the overall and specific objectives. The chapter further provides the significance and scope of the study.

³ Subsistence farmers are farmers who focus on growing enough food to feed themselves and their families.

- **Chapter 2: Theoretical Framework**

This chapter presents the theoretical framework of the study of flooding, which acts as the base for ascertaining the link between livelihoods and the impact of floods (disaster exposure).

- **Chapter 3: Review of Literature**

This chapter presents the secondary research in the form of the theoretical framework and review of related literature from published sources, which is used to support the primary research.

- **Chapter 4: Research Design and Methodology**

This chapter describes the study design, sample selection and size, study methodology and how the data analysis was carried out. It further presents the research ethics, and reliability of the study.

- **Chapter 5: Results and Discussions of the study**

This chapter provides the results of the study. Furthermore, the chapter presents a discussion on the results and links the results with the literature review, where applicable.

- **Chapter 6: Conclusion and Recommendations**

This chapter provides the summary of the research findings and concludes the research. The chapter provides recommendations for future action.

1.10 Conclusion

This chapter has dealt with the background to the problem, the problem statement, the objectives of the study, and the significance of the study. The problem identified in the statement of the problem is the seasonal flooding that displaces and disrupts the socio-economic activities of people living in the Luhonono area. The significance of the study has been discussed in this chapter, indicating that the study will benefit not only the local people,

but also policy makers and other researchers who wish to further their studies on the impact of floods.

CHAPTER 2

THEORETICAL FRAMEWORK

2.1 Introduction

For this study, the focus for attention was drawn from literature on vulnerability, as reviewed. *“Vulnerability is defined as people’s differential incapacity to deal with hazards, based on the position of groups and individuals within both physical and social worlds”* (Dow, 1992, p. 417). The concept of vulnerability has been described by many authors, such as (Dow, 1992), (Adger, 2006), (Blaikie, et al., 1994), and (Pelling, 2003). *“Vulnerability refers to the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from impacts of a natural hazard”* (Blaikie, et al., 1994, p. 11). On the hand, resilience is the *“the capacity of the system, community or society potentially exposed to hazards to resist, adapt and recover from hazard events, and to restore an acceptable level of functioning and structure”* (Reliefweb, 2008, p. 47).

Therefore, this chapter presents two models – the Sustainable Livelihood Approach (SLA) model to poverty alleviation and the Pressure and Release (PAR) model – to measure the progression of vulnerability to flood hazard in the Luhonono area.

2.1.1 The Sustainable Livelihood Approach (SLA) model to poverty alleviation

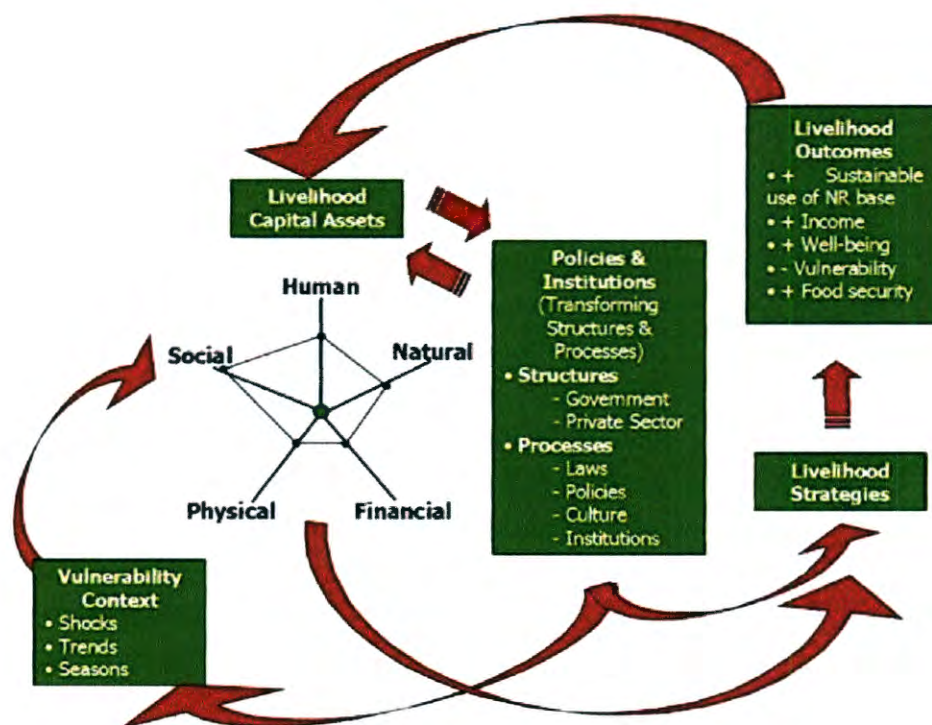


Figure 2.1 Sustainable Livelihood Framework: Source: (DFID, 1999)

The sustainable livelihood approach model to poverty alleviation developed by (DFID, et al., 1999), as shown in Figure 2.1 above, depicts the processes of the sustainable livelihood approach in development studies. “The sustainable livelihood approach has its basis on the assessment of different capital that forms the circumstantial to an individual, households or community livelihood, which are then evaluated in relations of their vulnerability to shocks and the institutions within which they occurs” (Morse & McNamara, 2013, p. 191). It is thus important to note that SLA has much applicability to this study, given the fact that it is a hypothetical model that brings about an easy analysis of the different aspects of people’s ‘assets, capabilities and activities’ within a specified marginal setting, and which have a degree of influence over them, and above all, which are essential in alleviating the presence of poverty and in promoting workable progress within a community (Oni, 2014). In this regard, it is once again important to note that the SLA framework brings together natural resources strongly in

its underlying forces and this forms the core with regard to livelihood and also poverty-changing aspects in a rural area, like Luhonono (Oni, 2014).

Therefore, the basic elements that are included in an SLA approach to poverty alleviation, as shown in Figure 2.1 above, include livelihood capital assets, vulnerability context, policies and institutions, livelihood strategies and livelihood outcomes (Scoones, 1998). An analysis of Figure 2.1 shows that the livelihood outcomes are the social and economic well-being of the individuals, communities and societies which result from the use of livelihood capital assets and livelihood strategies being, while being guided by institutional policies to reduce vulnerability (Scoones, 1998). The basic dimensions and their influence on the sustainability of the people living in flood-prone areas are described and explained in the sections which follow.

2.1.2 Livelihood capital assets

Livelihoods comprise the capabilities, possessions (societal means) and undertakings obligatory for a total means of existing (Krantz, 2001) and (Christensen & Pozarny, 2008). *“Livelihoods are sustainable when they can cope with and recover from stresses and shocks, maintain or enhance capabilities and assets (current standard of living) without undermining the natural resource base”* (Krantz, 2001, p. 1) and (Christensen & Pozarny, 2008, p. 2).

Livelihood capital assets consist of human capital (labour, education and skills); natural capital (land and access to common property resources); financial capital (wages and access to credit); physical capital (water supply, housing and communications); and social capital (social status, strong links with family and friends, and traditions of reciprocal exchange) (DFID, et al., 1999); (Morse & McNamara, 2013); (Lawal, et al., 2011) and (Odero, 2006). It is thus important to note that livelihoods are affected by the variety and magnitude of assets, as well as the stability that exists among the assets (Christensen & Pozarny, 2008). In this regard, the approach suggests *“that people require a range of assets to achieve positive livelihood outcomes and no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek”* (DFID, 1999, p. 2.3) (DFID, et al., 1999).

The Sustainable Livelihood Approach (SLA) is a multi-capital methodology that is applied within situations of helplessness (Morse & McNamara, 2013) and (March, 2003). The basis on which the livelihood strategies of a households' assets level are built will depend on the value and functionality of such assets (Morse & McNamara, 2013). It is thus important to understand that every household exploits and combines the resources offered to it to preserve and improve the livelihood assets of its members (Morse & McNamara, 2013). It is important to note that five assets are identified and these include the following, as outlined below (DFID, et al., 1999), (Morse & McNamara, 2013), (Lawal, et al., 2011):

- *Human asset (or capital)*
- *Physical asset (or capital)*
- *Financial asset (or capital)*
- *Social asset (or capital)*
- *Natural asset (or capital)*

- ***Human capital (HP)***

HP is believed to be one of the essential components of livelihood assets within households. The education, experience and health status of the members of a household are regarded as the major HP or assets (Lawal, et al., 2011). On the other hand, (Allison & Ellis, 2001) and (DFID, et al., 1999) categorise or classify human capital as "*members of the households' skills and knowledge that they can apply to create the aspect of resilience*" (Oni, 2014, pp. 104-105).

- ***Physical Capital (PC)***

This type of capital is quite essential for an individual household to meet their direct needs, as well as providing access to other essential capital within the sustainable livelihood framework of the household. "***PC means the resources created by people to support their livelihood, such as buildings, canoes, bicycle, agricultural equipment and machineries, potable drinking water, electricity, communication systems (the internet and cell-phones) as well as equipment, tools and machinery needed to support livelihoods***" (Allison & Ellis, 2001); (Krantz, 2001); (Morse & McNamara, 2013); (Lawal, et al., 2011) in (Oni, 2014, p. 105) .

- ***Financial capital (FC)***

FC is also referred to as '*economic capital*' and is more comparable to '*physical capital*' since it allows the household admittance to other types of '*capital*' that are essential for their '*livelihood strategies*' (Morse & McNamara, 2013). "*FC includes among others cash income, savings, credit and regular allowances or pensions*" (DFID, et al., 1999); (Allison & Ellis, 2001) in (Oni, 2014, p. 105).

- ***Social capital***

Social Capital signifies the social resources the households possess, such as networks, social claims, social relations, affiliations, and associations (Krantz, 2001) and (Morse & McNamara, 2013) in (Oni, 2014, p. 105). "*SC includes associations that limits on expectation, and the capability of people to work together in order to move forward and increase their access to broader networks or organizations. It is best to mean as what others can carry out for the family rather than what the family members are able to achieve for themselves*" (Allison & Ellis, 2001, pp. 377-388).

- ***Natural capital (NC)***

NC is referred to as "*natural prepared resources which include land, water, soil, mineral, plant, fisheries, animal life and territorial water bodies*" (Allison & Ellis, 2001) and (Morse & McNamara, 2013) in (Oni, 2014, p. 105). It is thus important to note that there are correlations that exist between natural capital and the vulnerability context within the context of sustainable livelihood. Rural households are enormously reliant on their natural environment for their livelihood (Chambers & Conway, 1992) and (Allison & Ellis, 2001). Moreover, there are numerous shocks, or tremors, that are believed to have the capacity to put an end to the livelihoods of the rural underprivileged people, and these are at times regarded as being prospectively normal occurrences (DFID, 1999) and (Oni, 2014). These tremors might cause overwhelming consequences for '*natural capital*', such as might be caused by veldt fires that would put an end to natural forests, and by floods and earthquakes that would seriously affect '*agricultural potential farm lands*' and '*infrastructure*' and modify the significance or efficiency of '*natural capital*' (DFID, 1999), (Chambers & Conway, 1992) and (Allison & Ellis, 2001) in (Oni, 2014, p. 105).

2.1.3 Vulnerability context

It is important to understand that livelihood assets in the SLA approach are studied within the framework or boundaries of vulnerability, which at times has a trend of mounting tension on the contemporary capital base of households (Chambers & Conway, 1992) and (Allison & Ellis, 2001). In fact, if the underprivileged are enabled to have admittance to the livelihood assets they may need to sustain their livelihoods, and are optimally sustained by amenity benefactors, such as the government and supporting organisations such as the Red Cross, then these underprivileged people will have the capacity to deal with those fundamentals related to their vulnerability context, which they can do with slight adaptations (Chambers & Conway, 1992); (Dixit, 2003) and (Allison & Ellis, 2001).

2.1.4 Livelihood strategies

It is thus important to understand that livelihood strategies in this regard might comprise the ability to cope, mitigate and decrease the power and the sources of ‘*shocks*’, in this case, flooding (Chambers & Conway, 1992); (Singh & Kalala, 1995) and (Allison & Ellis, 2001).

2.1.5 Livelihood outcome

This component of the SLA is the actual foundation of livelihood strategy opportunities that can be effectively and efficiently used in an event of shock, or a time of the year which makes the ‘*capital base*’ of the household decline, as watered-down by societal compromise (Singh & Gilman, 2002). “*A livelihood outcome can be described sustainable if following exposure to risks and shocks the people can get better and sustain capabilities and assets at the present and in the upcoming period; and can uphold an excellent normal living*” (Allison & Ellis, 2001, pp. 377-388).

2.2 Pressure and Release (PAR) model – Progression of vulnerability of Flood hazard in Luhonono area.

This study was framed (by the researcher) on the basis of the Pressure and Release (PAR) model developed by (Blaikie, et al., 1994). The Pressure and Release (PAR) model depicts disaster as a ‘product’ of ‘physical exposure’ and ‘socio-economic pressure’ of the community to a particular unfolding disaster (Blaikie, et al., 1994). The PAR model distinguishes between three major components of the social point of view of the community to which the livelihoods of the community are actually linked. These are:

- The root causes
- Dynamic pressures
- Unsafe conditions.

The other component is on the natural side, which is the natural hazard itself – in this regard, flood. The major root causes of vulnerability of the community include economic, demographic and political processes between the groups of people within the community. However, the dynamic pressures translate economic and political processes into local contexts. The PAR model continues to present the unsafe conditions, which are said to be the specific forms in which vulnerability is obviously expressed, in the form of phase, as well as universe, such as those that come into being due to the ‘physical environment’, ‘local economy’ and/or societal relations of the community (Blaikie, et al., 1994). Therefore, this model has been used to study the progression of vulnerability to flood hazard in the Luhonono area (as reflected in Figure 2.2 below).

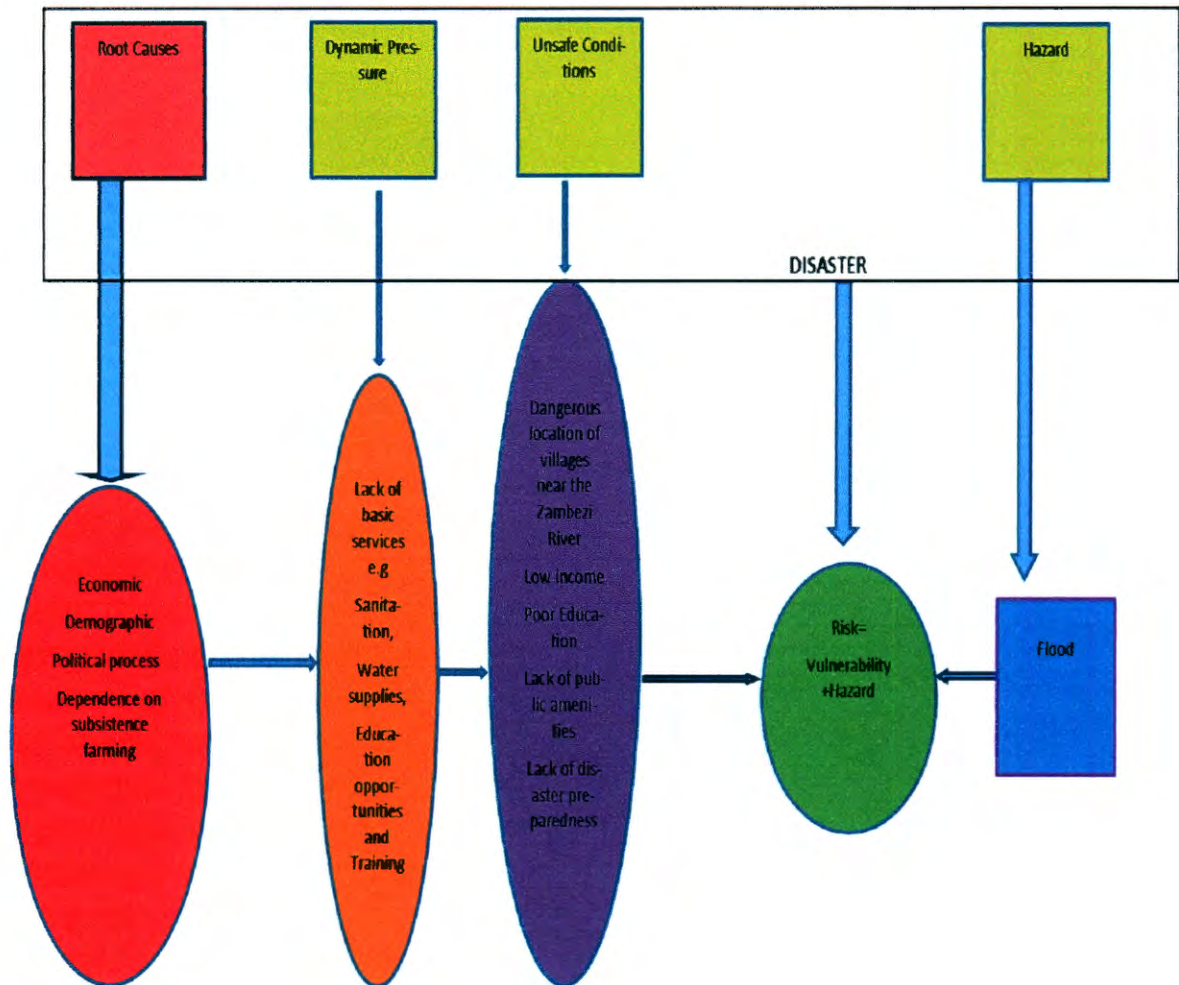


Figure 2.2 Pressure and Release (PAR) model – Progression of Vulnerability Flood Hazard in Luhonono Area (Own Designed)

2.2.1 Root Causes of Vulnerability

It is important to note that in the pressure and release model, the root causes are the most hostile processes embedded in the troubled social, economic and political setting, and this depicts the distribution of disparities in an area (Singh, 2014). In fact, the root causes that render the communities in the Luhonono area vulnerable are economic, demographic and political processes. People in the Luhonono area are restrained by their poor economic level, demographics, political processes, and dependence on substance farming. Since the people are poor and the policies of the government are imposed on them in one way or the other, people in this area have no options but to continue living the way their forefathers have left to them.

2.2.2 Dynamic pressures

The dynamic pressure works on the underlying root causes to create unsafe conditions within a community (Singh, 2014). Therefore, for this study area, the dynamic pressures leading to vulnerability comprise the lack of basic services, such as sanitation, water supplies, health services, education opportunities, and training. These are deemed essential basic components of people's survival in order for them to be able to withstand the impact of a disaster. The communities of the Luhonono area suffer from recurring floods that result in inadequate water supplies being available which are suitable for human consumption. Access to health and education facilities is a major cause of concern. There are no toilets and people relieve themselves in the surrounding bushes, and even defecate in the water during periods of high flood peaks, when only small islands of land are left. This becomes the major source of diarrhoea and other health-related problems. The delivery of medical services is also a challenge, and at times there is no medicine to offer for treatment of sick people during flood periods. It is essential to note that there is also a lack of good quality education and training in the area, since highly qualified teachers will opt not to work in such areas. Though the government of Namibia has introduced bush allowances for those who work in such environments, this seems not to have solved the problem as yet. It is thus important to suggest that training should be provided to these people in order for them to develop resilience and ability to cope with the situation.

2.2.3 Unsafe conditions

This phase of the PAR model is underpinned by the dangerous location (Singh, 2014) of villages near the Zambezi River, the low-income level of the communities in the area, poor education, lack of public amenities, and finally, lack of disaster preparedness. The study area is situated very close to the Zambezi River and this renders the community likely to face the serious threat of an impending disaster. In fact, a disaster, like flooding, can cause extensive damages to the community.

It is thus important to understand that the income levels of the people in the study area are very low and since they solely depend on subsistence farming, other agricultural activities,

especially crop farming, are not practically possible. In this regard, the community is unable to fully enjoy a good quality life owing to their low financial capacities, and in the end this accelerates their vulnerability to floods. In general, the people residing in the Luhonono area are not highly educated, apart from those working in government institutions such as schools and health facilities. Dropping out from school and poverty, which is aggravated though the high level of consumption of locally brewed beers such as Tombo,⁴ are the major cause of the poor level of education (Singh & Kalala, 1995).

Given the fact that the level of education is very low for the majority of the people in Luhonono area, this reflects that these people are less empowered and therefore, more vulnerable to flood disaster. The major concern is that there is only one health centre available in the area, and this health facility caters for adjacent areas, such as Namiyundu and Nankuntwe, respectively. In most cases, people resort to crossing into Zambia for access to medical facilities.

The last aspect under unsafe conditions is that of the lack of disaster preparedness of the community in Luhonono area. Despite the fact that the government of Namibia might be aware of the dangers of flooding to the community, and their low level of education, it has not taken any pertinent measures to increase the level of preparedness of the community in order to help them develop total resilience against flood impacts (Singh, 2014).

⁴ A locally brewed beer made from water and sticky dark brown sugar. This beer enjoys great preference among the communities over the industrially brewed beers, like Windhoek lager, due to the fact that the beer is very cheap but very effective.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

Flooding is considered by many people all-over the world to be one of the most complex of natural occurrences, but is among the less understood of all natural hazards, after drought (Smith, 1983). The first component of this chapter focuses on the different types of floods as a natural disaster (particularly those that are evident in the Luhoanono area) and this should enable readers to better understand its complications. Particular attention in this chapter has been given to the characteristics that make floods more distinct from other natural disasters. A further focus of attention that is expected to add significance to this chapter is the discussion of the Zambezi River levels for the period 1965–2011 and the rainfall per season for 2002–2011. The peak years have been circled in Figure 3.1 below to show the differentiation and degree of impact to the community. The impact of floods on the livelihood of people, an overview of flooding as a natural disaster, and flood risk resilience options for vulnerable rural communities will be discussed in more detail in this chapter. In addition to the above-mentioned points of discussion, coping or resilience against flooding, economic benefits of flood, and the effect of floods in the developing countries, of which Namibia is part, will be discussed briefly. The chapter gives a brief account of the Disaster Risk Management situation for Namibia that is guided by the National Disaster Risk Management Policy (NDRMP) of 2009. The ultimate goal of the policy is to contribute meaningfully to the attainment of sustainable development, in line with the envisaged Namibia's Vision 2030. The chapter also briefly discusses the Disaster Risk Management Act, 10 of 2012.

3.2 Overview of floods as a natural disaster

Floods are the most complex natural disasters, but are only slightly understood by most people (Smith & Ward, 1998). The level of the Zambezi River has been varying since 1965, with the highest levels being seen in 1979 and 2009, respectively (Figure 3.1 below). During these years, the flood distribution in the low-lying areas (the flood plains of the Zambezi region) has been extremely widespread, causing huge damages to properties and crop fields, as well as the

loss of lives of livestock and people (Purvis, 2002). However, it is important to note that flooding also brought essential benefits to the rural people in terms of food, such as fish and other water natural resources, such as water lilies.

More rain was received during the 2007/8, 2008/9 and 2009/10 rainfall seasons (Figure 3.2 below), which resulted in greater flooding, especially in 2009. The level of the Zambezi River has been increased by the flow of rainfall water from the Western Province of Zambia. As a result, the Luhonono area experienced early flooding in 2007/8, 2008/9 and 2009/10 owing to the above-normal rainfall received in the upper areas of Zambia's Western Province. However, a similar rainfall pattern was evident in the Zambezi region in the same years (Figures 3.2 and 3.3 below).

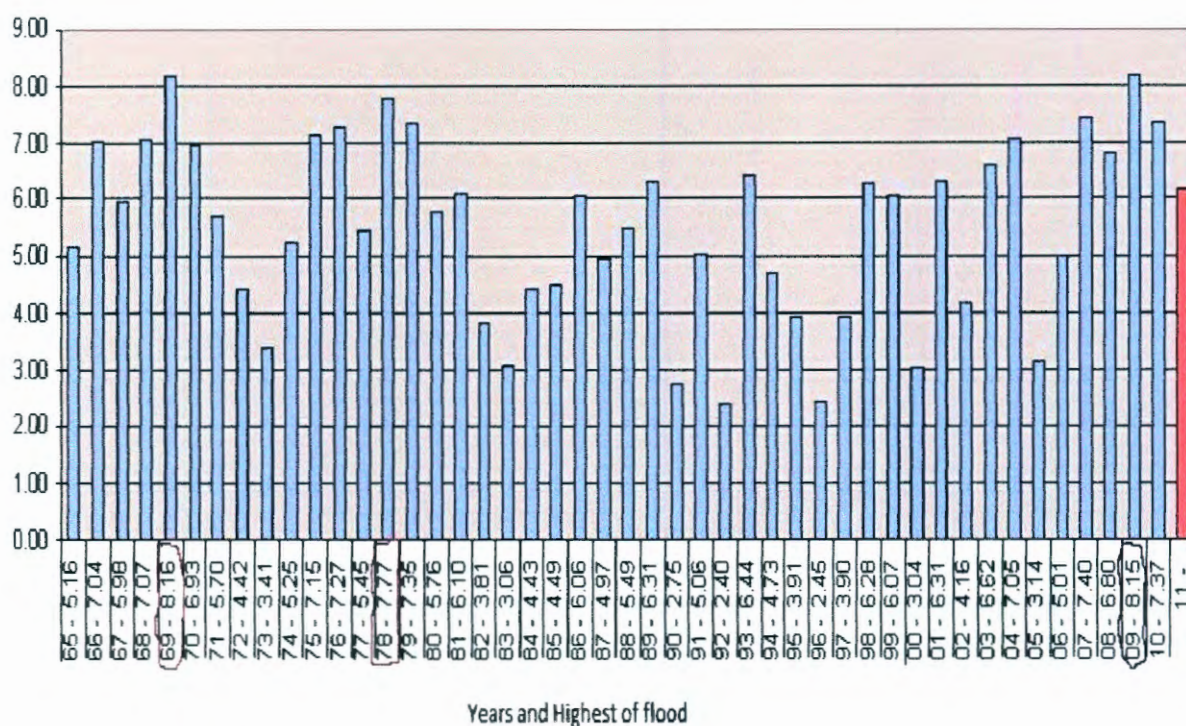


Figure 3.1 Zambezi River Levels: Year and highest level reached (Peak years cycled): Source: (www.caprivi.biz/flood.htm, 2012)

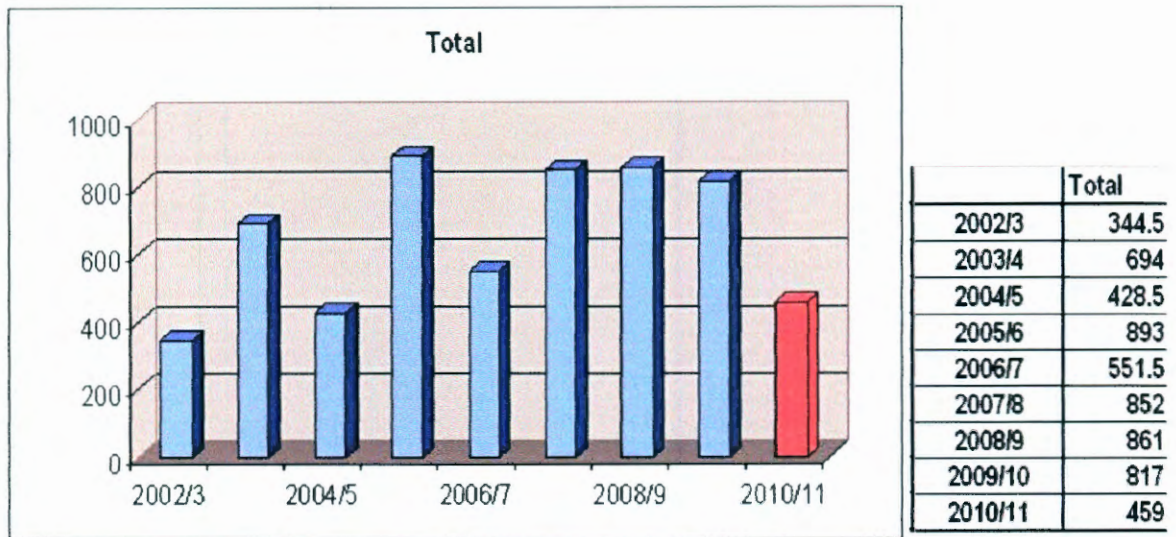


Figure 3.2 Total rainfall per season in the upper catchments of Zambezi River: Source: (www.caprivi.biz/flood.htm, 2012)

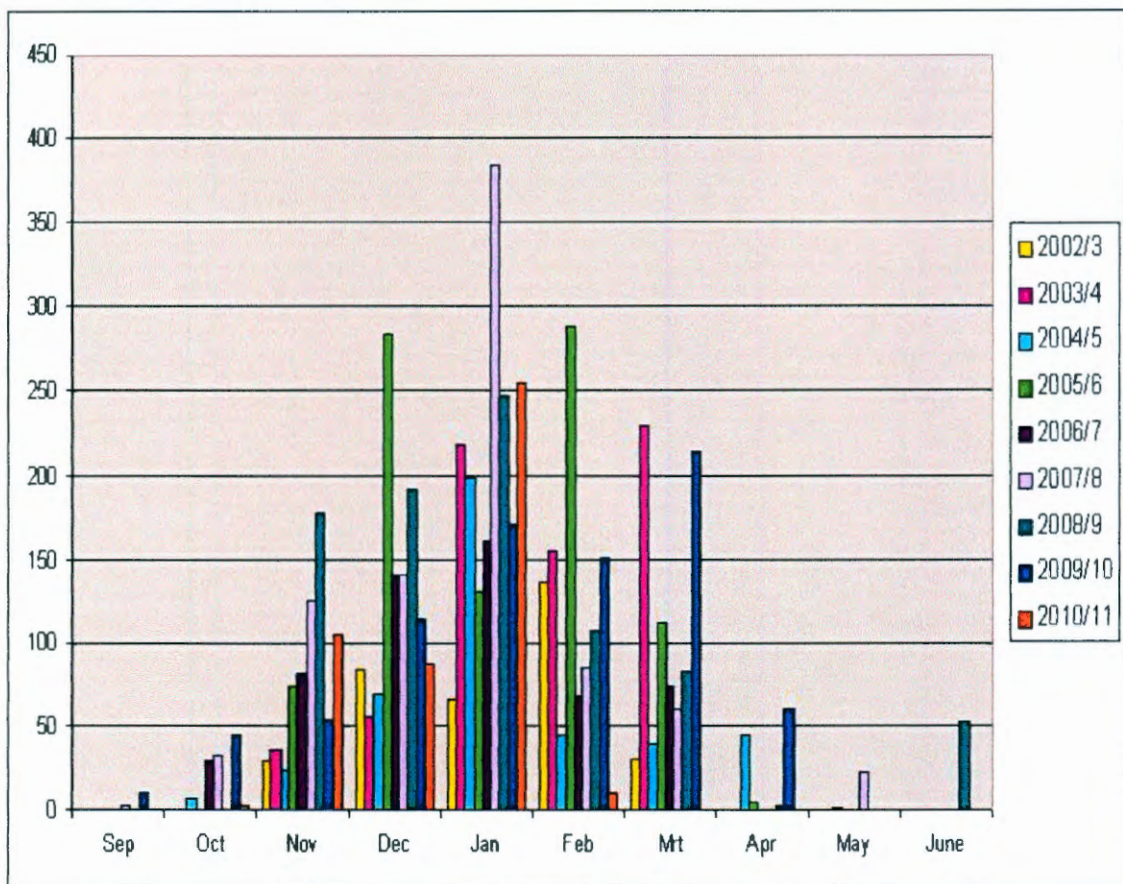


Figure 3.3 Monthly rainfall distribution in Zambezi region: Source: (www.caprivi.biz/flood.htm, 2012)

3.3 Types of Floods

Generally, Namibia experiences flooding from various flood types – flash floods (Figure 3.4 below), and river floods. The regions that are most affected by several of these floods are Zambezi, Kavango and Ovamboland. The central part of Namibia is understood to be very safe from flood effects, and only in certain cases is flash flooding evident, in small localised points. Globally, there are different types of floods (Dey & Singh, 2006). It is important in this study to begin by exploring the meaning of flood. *“Overflow of water of the normal confines of a stream or other body of water or an expanse of water that submerges land, a state of high water level along a river channel or on the coast that leads to inundation of land, which is not usually or not normally submerged. Furthermore, a flood is a natural event that can have a far reaching effect on people and the natural environment”* (Reliefweb, 2008, p. 27). Floods in the Luhonono area occur annually between February and July, arising from the Zambezi River which swells and spills over excess water after receiving large amounts of rainwater from the high catchment areas of the Western Province of Zambia (Kirchhoff & Bulkley, 2008). The following are the different types of floods that are experienced in the Luhonono area:

3.3.1 Riverine floods

This type of flood usually occurs when the rivers or basins receive large amounts of water from heavy rainfall during spring (Kirchhoff & Bulkley, 2008). It is essential to note that the dynamics and the general distribution of floodwaters over a given area will generally depend on the topography and the terrain of the area (Kirchhoff & Bulkley, 2008). However, in mountainous or hilly areas, such as the central part of Namibia, flooding may only be experienced for a few hours or minutes soon after heavy rains, because water will flow at a high rate and away down the channel into drainage basins or rivers (Kirchhoff & Bulkley, 2008).

However, riverine floods in the Luhonono area are quite significant and last for months, because this area lies close to the mighty Zambezi River. Riverine floods have been common in the Luhonono area from the time immemorial. However, in case of extreme flooding, more than 80 % of the area is inundated, stretching far beyond the banks of the Zambezi River. The worst flooding experienced in the area over the past 45–50 years was in 1957/8, 1978/9, 1993/4,

2003/4 and 2008/9, with an average of 10-year gaps (Mendelsohn & Roberts, 1997). The floods cover the floodplains where the natural drainage network is very weak, with little capacity to carry the run-off generated by the overflowing of the Zambezi riverbanks, as well as the huge amount from rain. This eventually results in the inundation of the vast area. During heavy rains (as shown in Figures 3.2 and 3.3 above), the Zambezi River expels large volumes of water into the streams or tributes adjacent to it, causing devastating flooding over a wide area for a long period of time, usually about six months (February to July each year), unlike in the mountainous part of the country where flooding is said to happen in minutes and last at most for a few hours (Kirchhoff & Bulkley, 2008).

3.3.2 Flash floods

This type of flood is more associated with powerful storms that result in high amounts of surface run-off into small drainage rivers and swamps in a very short period of time (Purvis, 2002). Flash floods are known to happen with little or no warning at all, and can eventually reach high levels within a very short time (Kirchhoff & Bulkley, 2008). Precisely, this is evident during the rainfall period (November to January each year) in the Luhonono area. Usually, this makes it very difficult for people to travel with vehicles during these months.

Figure 3.4 below shows a village that was flooded soon after heavy rains in the Zambezi region. This type of flooding is not very common in Luhonono area due to the sandy soil that is more dominant and also the existence of informal channels where water tends to accumulate. However, the village shown in Figure 3.4 below is susceptible to flooding each time when heavy rains are received and this is due to abundant underground water.



Figure 3.4 Waterlogged Villages in the Zambezi region soon after heavy rainfalls resulted in flash flooding

Source: (Namibiasun, 2014)

3.4 Flood characteristics

The degree of flood impact in a given situation will largely depend on the depth, velocity of flow, the discharge volume of the water, the duration of the flood period, and the deposition load, such as soil sediments, chemicals and salts (Ezemonye & Emeribe, 2011). From the study, it was established that the duration of the flooding ranges from 5 to 6 months (usually from February to July in each year). Therefore, it is important to note that the length of flood inundation of an area would represent the period inundation while the area is in topmost (Ezemonye & Emeribe, 2011).

In the study area, the velocity of the flood during the first phase (from February to April) has been observed to be fast, and then become sluggish when the whole area has been fully inundated (Mendelsohn & Roberts, 1997). A general increase in the flow of water in the Milapos area has been evident from the initial outburst from the Zambezi River banks around February to April, which then declines around May when the floodplains are inundated, and by June/July, the flood begins to subside (Mendelsohn & Roberts, 1997).

It is thus important to note that flooding in the study area occurs when the soil becomes saturated with water (largely depending on the amount of rainfall received prior to the riverine flooding) and the infiltration rate is zero, and runoff through the Milapos can no longer be contained and the natural swamps and ponds are filled up, and eventually the floodplains become submerged (Mendelsohn & Roberts, 1997) and (Ezemonye & Emeribe, 2011).

3.5 The impact of floods on the livelihoods of people

On average for the past few decades, over a hundred million people every year have been affected by flooding, all over the world. This is quite enough for governments to take radical actions towards reducing these figures to much more acceptable margins. The numbers of people affected globally by flooding have grown tremendously, from around four million in a year in 1950 to the present state, and this represents an increase of one per cent, per year (Emergency-events-databasa, 2011).

A livelihood embraces know-how, possessions and undertakings which are necessary for obtaining the resources that are essential for the survival of the poor rural people affected by floods (Blaikie, et al., 1994); (International-Labour-Organization, 2006); (DFID, et al., 1999). In fact, livelihood is presented as a whole, comprised of dynamic interactions between actors and five essential types of capital (human, natural, physical, financial, and social capital). These essential categories of capital constitute the building blocks of livelihood (Carney, 1998). *“Livelihood is, therefore, defined as comprising of the capabilities, assets and activities required for a means of living linked to survival and future well-being”* (Blaikie, et al., 1994, pp. 174-175) and (Reliefweb, 2008, p. 37).

Livelihood assets comprise the means of production available to a given community that can be used to generate material resources sufficient for the community's survival (IISD, 2003). It is important to understand that the relationship that exist amid calamity contact, as well as access to the means of living, has been well acknowledged elsewhere in ‘disaster literature’ (Abdellatti, et al., 2003). Therefore, the real potential effects of disaster are being experienced by people living very close to hazard-prone areas. This is made worse by the poor overall

protection of people against the impact of anticipated disaster, by the below-margin coping capacity of the affected people during and after a dangerous incident, and also by the adverse effects of disaster on the developmental achievements gained prior to the occurrence of the hazardous event (UN, 2000).

Recurring disasters in different parts of the world have shown that the impacts of a disaster, in terms of life, properties, and potential for recovery, are borne excessively by many countries, and within them by the poorest sections of the society (Vlachos, 1995).

Therefore, flood as natural disasters impact directly on rural communities in Luhonono, threatening their rural livelihood, including food security and family welfare. *“Livelihood is sustainable if it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base”* (Krantz, 2001, pp. 1,3,7,18). This gives rise to great concern in the flood-prone areas of Luhonono in Zambezi region of Namibia. It is essential to note that the more asset bases a community has, the more sustainable its livelihood is, in other words, the community become sufficiently sustainable (Gwimbi, 2009).

Therefore, it is essential to understand that *“priorities that support poverty reduction through sustainable livelihoods approach need to be enhanced”* (Cannon, et al., Not Dated, pp. 31-46) in flood-prone circumstances, which is essential in strengthening the links between sustainable livelihoods and vulnerability reduction (Gwimbi, 2009) and (UNDP, 2008).

The aspect of human lives and properties, as well as fiscal undertakings in particular, that may possibly be adversely affected in an actual dwelling, should a particular disaster occur, is seen as an aspect that is related to the actual side-by-side of protection against a specific risk (Cannon, et al., Not Dated); (Carney, 1998); (UNDP, 2002). While at some point all assets are equally important to rural communities, natural resources are without doubt the most important (Carney, 1998). The community needs all the available natural resource to sustain their livelihood (Carney, 1998). In the Luhonono area in particular, rural communities are predominantly dependent on natural resources and are severely affected by deteriorating environmental conditions and factors limiting access to them (Carney, 1998).

It appears that the number of households reluctant to move from the flood-prone areas of Luhonono is increasing, with additional belongings and property becoming owned by households, which affects the available resources needed for their sustainability (Gwimbi, 2009). Generally in Africa's rural areas, the vulnerability of people to floods is closely linked to access to resources and the assets they possess (Gwimbi, 2009). After the 2000 flood experienced in the Lower Muzarabani District in the Zambezi basin, it was reported that a considerable relationship exists between flood impact, the resources which people have access to, and the geographical location of the communities within the floodplain (Gwimbi, 2009).

3.6 Causes of Flooding

Flooding in a particular area occurs when a river's carrying capacity has gone beyond its level and water begins to run over the banks, across the lower areas through the informal channels (milapos)⁵ towards the floodplains, and eventually causing inundation of the area (Geography-GCSE, Not Dated); (eschooltoday, 2010). Generally worldwide, flooding tends to be more likely caused by heavy rainfalls that are collected in the high catchment areas upstream, and the faster the rainwater flows and reaches the river channels, the more likely it is to cause flooding over the floodplains (eschooltoday, 2010). It is important to note that the nature of the landscape or topography around the receiving river will have an immense influence on how quickly rainwater reaches the channels and causes devastating flooding. There are a few events that can cause flooding in a particular area and the following are the major causes of flooding globally (eschooltoday, 2010) and (Wright, 1996):

- Rainfall
- River overflow
- Strong wind in coastal areas
- Dams breaking
- Ice and snowmelts.

⁵ Informal water channels

In the Luhonono area, rainfall and river overflow are the main causes of flooding. However, flooding is more commonly experienced from heavy rainfall due to the fact that at times the natural watercourses do not have the capacity to take excess water and eventually the river banks burst and the water spills over. It is also important to note that floods can result from other phenomena, such as storm surges associated with cyclones, and a tsunami at a high tide in coastal areas that might coincide with higher than normal sea levels (EnvironmentLaw, 2008). This is not evident in Luhonono area. Dam failure triggered by natural events, such as earthquake or man-made faults in technical designs, will also eventually result in flooding of the low-lying or downstream areas, and this can happen even during dry periods of the year (EnvironmentLaw, 2008). It is important also to note that there are factors that may contribute to flooding in a particular area and these include the volume, spatial distribution, intensity, and duration of rainfall over supply catchment areas; the capacity of the watercourse or informal stream network (milapos) to convey runoff water; ground cover; topography and also tidal influences in coastal areas.

It is evident in the Luhonono area that the location of villages within close proximity to the Zambezi River is believed to be the major factor in causing floods in the area over past years, since certain waterways have been blocked. This contributes to riverine flooding events and the villages are prone to regular flooding, as history can show. The informal water channels (milapos) are likely contributing major physical factors, as these Milapos spread water from the Zambezi River down the floodplains. The flow of the water through the Milapos is regulated by their structural abilities; these channels are in most parts steep, thus accelerating the flow of rainwater from the Zambezi River, already flowing at a great, steady rate. This has resulted in allowing the water to flow extremely quickly down through the Milapos. Certain Milapos are structurally relatively narrow, thus the shape of the Milapos accelerates the water towards the floodplains. It is important to note that not only does this cause an increase in water flow speed, but also an increase in volume of water discharged, which eventually devastates the whole Luhonono area.

“Some villagers in the Kabbe constituency of the Caprivi Region are relocating to higher ground after the floodwaters of the Zambezi River started reaching their homesteads and

maize fields over the past few days. The Zambezi River measured 7.16 meters yesterday at Katima Mulilo and people in the Katima Mulilo Rural constituency also had to move to higher ground, according to Caprivi Governor Leonard Mwilima. I am right now in this constituency and floodwaters are arriving, but the situation is under control, Governor Mwilima told 'The Namibia' yesterday afternoon" (Weidlich, 2010, p. 1).

3.7 Positive impacts of floods

Flood is described to be the "overflow of huge quantities of water on the normally dry land" (Zakaria, 2011) in a given community. "The EU flood directive defines flood as a temporary covering by water of land not normally covered by water" (Zakaria, 2011, p. 1). Although flood is observed by many as a devastating incident for the communities usually affected by flood, it has at all times been a vital part of environment's reclamation process, given the fact that many continuing, progressive impacts on the livelihood of the communities are evident (Zakaria, 2011); (Woo & Kim, 1997). The following are the major positive impacts flood can bring to the communities:

- "Revives ground water" (Zakaria, 2011, p. 1): – it is important to note that many parts of Namibia depend largely on underground water for fresh water needed for human consumption.
- "Renews the wetland" (Zakaria, 2011, p. 1): – the ecology of the wetlands is balanced by the annual occurrence of flooding in areas like Luhonono. This is important in order for the wetland to supply the communities with healthy water supplies and, above all, the air quality of the surrounding area is relatively improved.
- "Returns nutrients to the soil" (Zakaria, 2011, p. 1):– it is important to note that floods bring and distribute organic matter to the farmlands that are essential in improving the fertility of the soil, which hence promotes yield. It is thus important to indicate that floods deposit fine silt onto the floodplain, making it more fertile and exceptional for agricultural practices and that poor rural communities can positively benefit from this through increasing food production (crops) for their sustainability.
- "Recovers natural fish stock" (Zakaria, 2011, p. 1): – flooding helps to increase fish population and in particular helps to improve natural fish stock.

- “Flood brings fresh water for irrigation” (Zakaria, 2011, p. 1): – since rural communities do not have any form of water supplies from the mainstreams, the occurrence of flood is a relief in terms of fetching water for irrigation of their backyard, small-scale vegetable gardens.

“Flood is certainly a natural calamity but still it is the only disaster that can bring some positive effects to the environment” (Zakaria, 2011, p. 1). Floods in the Luhonono area have brought relief in terms of vast amounts of fish, and other aquatic resources essential for the community’s livelihoods. At times, people in the area could depend largely on these resources when their crops were swallowed by the floods. Usually, the availability of fish and other aquatic natural resources, such as Isoto,⁶ Inkuma⁷ and Ino,⁸ caused by flooding brings more income to the local people in the Luhonono area. These natural resources are typical Masubia⁹ traditional foods.

3.7.1 Different vulnerabilities and impacts to flooding

“Vulnerability is the degree to which a system (in this case, people or assets) is susceptible to or unable to cope with the adverse effects of natural disasters. It is a function of the character, magnitude and rate of hazard to which a system is exposed, its sensitivity (the degree to which a system is affected, adversely or beneficially) and it’s adaptive capacity (the ability of a system to adjust to changes, moderate potential damage, take advantage of opportunities or cope with the consequences)” (EPA, 2013, p. 10) and (Jha & Lamond, 2012, p. 173).

The following are the different types of vulnerabilities that may be seen to exist in a community (Jha & Lamond, 2012); (Zahran, et al., 2008) and (Walker & Dolan, 2004). However, for this study the economic, social and environmental impacts are discussed in more detail:

6 The flower head of water lilies, uses as food, usually cooked with meat and fish.

7 The underground tubers of water lilies; these are not very sweet and can only be eaten after being cooked with fish or meat.

8 These are underground tubers of water lilies, these are usually sweet enough to be eaten directly from the source and can be cooked with meat and fish.

9 An ethnic group found in the Zambezi region, covering the Luhonono area.

- *'Individual or Household vulnerability'*
- *'Social vulnerability'*
- *'Economic vulnerability'*
- *'Physical vulnerability'*
- *'Environmental vulnerability'*
- *'System vulnerability'*
- *'Place vulnerability'*

3.7.1.1 Economic Impacts (Direct and Indirect)

It is important to note that the direct economic impacts of flooding will reduce the economic abilities of the communities owing to the losses of items. In most cases, the poor will fail to even replace the damaged or destroyed properties. *"Flood cause substantial damage to properties and infrastructures, but on the other hand can have beneficial consequence comparable to deposition of organic matters essential for agricultural land and the retention of the moisture content of the soil"* (Ward, 1978, pp. 173-175). Very important to understand is the fact that the damages can be tangible and intangible (Ward, 1978).

Intangible damages are difficult to quantify and these include anxiety, fear, annoyance, distress, insecurity, ill-health and loss of life of a family or community member (Ward, 1978). The tangible damages are divided into two categories: These categories are the *'direct'* and *'indirect'* categories. The direct damages are related to the physical or forceful contact upon properties that can easily be damaged by flood. These include buildings, roads, bridges, agricultural farmland, crops and railway lines (Ward, 1978). The indirect damages are the losses related to the slowdown of the economy and these include loss of production, loss of basic income and business potential of the affected people, and breakdown of services and delivery of essential basic goods which the community would need for sustainability (Ward, 1978).

It is important to understand that the effort to evacuate affected people to safer high ground presents economic losses attributable to the fact that doing so costs considerable amounts of money (Bryant, 1991). Income loss would eventually cut across all the communities, including those who do businesses in the affected area and this causes financial distress to the entire communities (Rose, 2004). It is thus important to note that since people who are most affected by floods are those in rural areas, wages related to agricultural practices would also decline sharply owing to floods in the affected areas (Banerjee, 2007). This has been evident in Bangladesh where the affected communities face a long period of inundating, which thus affects them economically. Indirectly, this affects the demand for agricultural labour needed for land preparation for the planting of crops, harvesting, and above all the yield (Banerjee, 2007).

3.7.1.2 Social Impact (Direct and Indirect)

It is thus important to note that floods have impact on a range of immediate needs by those affected. The needs would include safe drinking water, food, and most probably shelter (Brouwer, et al., 2007). The people who have been affected by flood are like to be more traumatised and, above all, more vulnerable. The demographic impact of damage to life due to flooding can be substantial, resulting in the age structures of the communities becoming destabilised. In fact, the affected communities would have very few old-aged people left alive, as well as children who could not fight for their survival. Community links are also being affected, because families will tend to stay apart for the whole duration of the flood period. In fact, after a major event of flooding, the displacement or break-up of families due to the death of a parent or a family member is evident among families themselves or the entire community. The other direct social impact of flood on the community is more associated with their health. It is evident that higher numbers of fatalities associated with waterborne and water-related diseases in some flood event occur, as compared to accidental drowning.

In countries like Bangladesh, the aspect of demographic characteristics of the communities varied greatly across the flood-affected areas and this eventually reflects in highly localised flood risk situations. The actual indirect social impact of flood, especially flood caused by river overflow, may alter the natural balance of the environment and ecology, permitting disease-causing organisms to flourish, thus affecting the community in general. Massive outbreaks of

malaria and stomach-related diseases can occur from such adjustments to the natural environment.

“An increase in diseases transmission and risk of epidemics in post-flood period depends on population density and displacement, and the extent to which the natural environment has been altered or disrupted” (Noji, 2005, pp. 29-33).

Indirectly, the social impact of flooding on a community can be seen through the births that occur soon after a flood with a high incidence of mortality and birth defects (Jha & Lamond, 2012). Above all, education of the children would be affected due to displacement and schools being closed for the whole period of the flood. Generally, floods accelerate poverty in most impoverished communities (Jha & Lamond, 2012). The direct social impact of flood on a community can further have serious consequences on the way people socialise with each other at work places, how they play at schools (especially school children), how they organise and conduct community gatherings, and generally on how they cope as members of the society, in other words, the societal cohesion disappears (Secretariat, 2007). In understanding the social impact of flood, or any disaster such as fire, it is important to note that during a disaster event, the communities tend to exhibit the uppermost degree of solidarity in an effort to support or help each other, with no sense of remuneration or any form of reparation. This emanates from the fact that these people share similar problems and all have the zeal to participate in order to overcome the problem (Foster, 1980).

3.7.1.3 Environmental Impact (Direct and Indirect)

The direct environmental impact of flood due to high rainfall is erosion in areas of steep topography. This in turn can cause massive damages to infrastructure, such as roads and communication systems, which are the most essential facilities to gain access to affected communities in any given situation (Jha & Lamond, 2012). The other major direct environmental impact of flood is related to the smothering of potential agricultural land by deposited soil sediment, especially sand sediments, with much of these sediments being poor in organic matter. In the end, this directly affects the yield of cereals and other crops, resulting

in negative impacts on human livelihoods, and nutrition in particular (Jha & Lamond, 2012). The indirect impact of flooding on the environment is the reduction in the vegetation's ability to deflect the energy of heavy rain. This is due to the damage flood can cause to the vegetation.

3.7.2 Coping or resilience against flooding

It is thus important note that disaster risk reduction processes should largely focus on strengthening community resilience, instead of merely responding to natural disasters (Kulig, 2000); (Vaz, 2000). It is thus imperative to address the root causes of vulnerability as a matter of serious concern, considering that, at most, would be an investment towards building total resilience of communities against floods and other natural catastrophes that would have the power to disturb the livelihood of the communities (Kulig, 2000). Therefore, before going further, it is important to define the term resilience:

“Resilience generally refers to those factors and processes that limit negative behaviors associated with stress and result in adaptive outcomes even in the presence of adversity” (Gwimbi, 2009, p. 74).

On the other hand, other literature defines *“resilience as a system, community or society potentially exposed to hazards to resist, adapt, and recover from hazard events, and to restore an acceptable level of functioning and structure”* (Reliefweb, 2008, p. 47).

In this regard, the question of what is going wrong, and what lessons can be learnt from the disasters, puts the aspect of building resilience in a community under enquiry, as far as their livelihood is concerned (Kulig, 2000). In fact, while studies of the risks and vulnerabilities of communities affected by floods have been conducted elsewhere (Gwimbi, 2009) and (Ellis, 1999), it is essential to note that many pertinent questions are still being brought up with regard to what can be done to increase resilience and also to minimise the negative impact of floods and other natural disasters on the rural livelihoods:

“How resilient would the communities be if the floods were to strike again? Are there strategies in place and if so who is responsible for their dissemination to the public? What information is encompassed in the resilience building? Are the strategies accepted or ignored by the local communities and, if ignored, what are the reasons?” (Gwimbi, 2004, p. 74).

Resilience strategies should imply that the communities not only have the abilities to cope and recover from the impact of flood or any other natural disasters, but also of adapting to the change brought about by the hazard through available priorities arising from the disaster (Adger, et al., 2005). Therefore, this could be in the arrangement of the solidification of the “*hazard-resistant structures, adaptive social behaviors, and dissemination of early warnings, among other strategies*” (Adger, et al., 2005, p. 1036)

It is thus important to note that resilience should embrace not only simply enduring, but also flourishing and reaping benefits from the stressor as well (Adger, et al., 2005), (Rolfe, 2006) and (Trosper, 2002). A critical question that still needs answers is: “*What livelihood options are available to communities that can enable them to become more resilient to flood risks while improving their living standards?*” (Start & Johnson, 2004, pp. 1-56).

In fact, options are many and wide-ranging and these include “*production based such as farming, trade-based activities (small scale retailing, hawking, sale of animals) and common property based (hunt and gather)*” (Start & Johnson, 2004, pp. 1-56). Therefore, it is imperative to gain a better understating of the resiliency concept before practical implications can be drawn about strengthening resiliency in the communities (Start & Johnson, 2004). On this note, it is also essential to understand that integrated conservation and development approaches suggest high prospects for a complete approach to flood management and in increasing total resilience against flood risks (Start & Johnson, 2004).

3.8 Economic Benefits of Flood

More than any other environmental hazard, flooding has been reported to bring benefits, as well as losses (Smith & Ward, 1998). Seasonal flooding constitutes a vital part of a river ecosystem where the flow regime maintains a diverse range of wetland habitats. It is important to note that river-line floods are normally restricted to flood plains, where events over many years have deposited silt and levelled the land. After the initial physical and ecological damages associated with major floods have subsided, there is often a burst of biological productivity (Smith & Ward, 1998).

It is important to understand that floods offer some sort of '*natural irrigation*' (Blaikie, et al., 1994, pp. 201-242). As the water recedes, people in the affected area practise flood-retreat agriculture, sowing their seeds in the wet soil. It is evident in Bangladesh that the regular annual floods which affect much of the inland help to restore the soil's fertility with a new layer of productive soil (Smith & Ward, 1998). In the semi-arid West Africa region, the seasonal inundation of large floodplains is of vital ecological and economic importance, which is responsible for a larger agricultural output than that associated with formal irrigation systems (Smith & Ward, 1998).

It has been reported in some parts of Nigeria that hunters, fishermen and hawkers have capitalised on flood disaster to make money. It is thus important to understand that when floodwater rises, this boosts the increase in fish population which eventually is a huge advantage for the fishermen. Fishermen do not need to go deep into the water to catch fish, since the rising of floodwater creates an impetus for fish stock to swim ashore (as shown in Figure 3.5 below). The other essential advantage which comes the way of the hunters is that animals that are driven by the flood to higher ground, thus boosting hunting activities in the affected communities, and this adds to the livelihood of affected communities (Smith & Ward, 1998).



Figure 3.5 Picture of young people carrying fish that were caught from the flood water in the Northern part of Namibia: Source: (Poolman, 2012)

3.8.1 Lessons learnt from other Flooding Globally

Worldwide, flooding is the most repeated of likely calamities (Gordon & Spoon, 2011). One hundred and seventy-eight million individuals remained distressed by floods in 2010 alone, and the over-all costs in terms of money in years with remarkable amounts of flooding, 1998 and 2010 respectively, surpassed \$40 billion (Gordon & Spoon, 2011). In Thailand, for example “*the country saw severe flooding in the year 1983 and 1995*” (Gordon & Spoon, 2011, p. 2) respectively, although the 2011 flood was more devastating and instigated countless harm.

In fact, the available data presents a thoughtful context about the critical interventions and improved organisation needed to be able to contain possibilities which are yet to come. From this understanding, the flood in Thailand in 2011 was the highest in terms of monetary consequences. “*The flood began in Thailand’s northern and central plains along the Chao Phraya and Mekong river basins*” (Gordon & Spoon, 2011, p. 1). In this regard, the city of Bangkok was severely affected, leaving it practically an island among the floodwaters. The city of Bangkok is built on the bank of the Chao Phraya River and historically its existence is intimately linked with the river (Gordon & Spoon, 2011).

Very important to note is the fact that the city has benefited precisely from the river, basically arising from its soil fertility, delta capacity, and its port, which appears to have been the centre of the municipality’s economy (Gordon & Spoon, 2011). “*Experience taught the people of Thailand a resilience that should be saluted and traditional houses were located at the edges of canals and were constructed on wooden stilts. However, new concrete housing abandoned the use of stilts. The casting away of this centuries-old tradition to be replaced by modern construction practices – but without adapting them to conditions – was the first blunder*” (Gordon & Spoon, 2011, p. 5).

The second blunder was to develop ‘*industrial complexes*’ in places that are prone to flood, which are characterised by being flat and plane in nature and where a small amount of rain can cause excessive flooding (Gordon & Spoon, 2011). The third blunder was an unsanctionable expansion ‘*model*’ that predominantly took into considerations the short tenure monetary advantages, without seeing the long tenure societal, as well as fiscal, costs. The final blunder

was the nature of inquiries (that failed to forecast the arrival of the flood disaster) that were carried out by institutions and the local institution of higher learning (Gordon & Spoon, 2011). From the Thailand flood, the first lesson learnt was that the disasters happened when the government of Thailand did not possess enough resilience to contain the effects of a threat (Gordon & Spoon, 2011). *“Hazards are exogenous while disasters are endogenous. Since flooding is a hazard, our ability to cope with consequences of floods contributes to a major disaster”* (Gordon & Spoon, 2011, p. 7).

The second lesson that is learnt from the Thailand flooding is that it is important to integrate complete or all-inclusive perceptions in developing the country. *“Land use, urban development, industrial activities and water management must be coordinated”* (Gordon & Spoon, 2011, p. 7). ‘Institutional’ restructurings manifest the third lesson from the Thailand flooding, since in this case, not even the government of Thailand or any public institutions were at the end of the day accountable overall for the tragedy. It is believed that the communities were rendered disorganised by the inconsistent announcements prepared by the system of the government and other bodies (Gordon & Spoon, 2011).

The fourth lesson that was drawn from the Thailand flooding was that researchers have been working on mostly hypothetical complications, rather than on a more hands-on aspect of the difficulties. The final lesson from the Thailand flooding is that focus should have been on rebuilding of the general public’s self-confidence, rather than on only concentrating on groundwork reform (Gordon & Spoon, 2011).

In the Pakistan flooding example, quoted below, the *“Irish aid agencies were operating during the time when the people in Pakistan were struggling with recovery from the catastrophic flooding in many parts of the country, the following components were the lessons learned by the Irish aid agencies in response to emergencies arising from flood:*

- ***Reaching those most in need:*** *In flood situations, it is often difficult to ensure that vulnerable people can access assistance. Aid agencies must dedicate resources aimed at overcoming these obstacles, and not simply concentrate on those people that are easiest to reach.*

- **Helping people to cope:** *Vulnerable people develop their own means and strategies to cope with flooding. Programmes that directly support communities and their local organisations in their own efforts work best, both in the short and the long term.*
- **Needs assessment:** *Conditions on the ground, not donor priorities, should determine aid programmes. All aid must help people most in need, and it must be the right kind, based on accurate information received from the disaster area. Aid must be provided in consultation with the local authorities and communities.*
- **Tailoring aid:** *Affected communities are not a homogeneous group – people have different livelihoods, options and priorities. Aid must be based on an explicit identification of such needs and capabilities.*
- **Going beyond the obvious:** *Needs assessments and relief programmes should go beyond current needs, and assess structural causes of vulnerability. While in the first instance relief is about saving lives, aid should be delivered and designed to contribute to a long-term improvement of people's lives, and the prevention of future catastrophes.*
- **Flood Risk Reduction:** *Flood management must cover entire catchment areas, and should include genuine participation of the area's population. Flood protection should go beyond technical fixes and include socio-economic considerations.*
- **Early warning:** *Poor people need early warning most, but many of them do not understand weather forecasting or the language of early warning. Special attention must be paid to ensure early warning mechanisms are appropriate for those groups most at risk.”* (Dochasnetwork, 2010, p. 9).

3.8.2 Lessons learned from 1993 flood of the upper Mississippi River basin

The flooding in the Mississippi basin was believed to be the second-highest in causing losses in states such as the Iowa, Missouri and Illinois, with the total amount of damages being about \$19.7 billion (Changnon, 2005) and (Changnon & Kunkel, 2001). It is thus important to note that the 1993 and 1996 floods have exhibited numerous common features that have afforded the following lessons (Changnon, 2003a):

- *“Floods exceeding past experience and design extremes continue to occur.*
- *Major unexpected impact occurred.*

- *Systems for monitoring and predicting flood conditions failed or were inadequate.*
- *Flood information was often incomplete, incorrect, or not timely.*
- *Many mitigation approaches failed but some succeeded.*
- *Flood produces benefits” (Changnon, 2005, p. 72).*

3.8.3 Best Practices from other areas globally in Disaster Management, such as in Bangladesh

It is important to understand that Bangladesh is one of the countries that are most prone to floods, globally, and it is located on the South Asian sub-continent. Bangladesh is located between 20° 34” and 26° 38” north, and between 88° 01”, and 92° 41” east (Hossain, 2003, p. 1). Disaster preparedness activities have been advocated by the Bangladesh government.

“Disaster preparedness is defined as *the organisation, education, and training of the population and all relevant institutions to facilitate effective control, early warning, evacuation, rescue, relief and assistance operations in the event of a disaster or emergency*” (Reliefweb, 2008, p. 22); (DFID, et al., 1999). In Bangladesh, disaster preparedness activities were meant to lessen, where conceivable, societal disorder as well as far-reaching damages to properties, while at the same time supporting the affected people to effectively and efficiently respond to, and eventually cope with, the significance of a disaster (DFID, et al., 1999).

It is thus essential to note that even though disaster preparedness activities advocated by the Bangladesh government were intended to serve in the actual reduction of the threat of flooding to the human life and potential loss to properties, these activities may seem to be very effectively managed when engaged as elements of an all-inclusive and total tragedy threat-lessening proposal (DFID, et al., 1999).

In the Bangladesh, a community-based disaster preparedness system has been implemented in three disaster-prone districts (Gaibandha, Bogra and Sirajgonj) where people are understood to

live along the riverbanks, and due to this, they are more regularly vulnerable to facing devastating floods and severe erosion (DFID, et al., 1999). Above all, these people have little access to government services and information that might help them to become more resilient (DFID, et al., 1999). Their lack of information, services, and economic opportunities, as well as poor infrastructure and the actual absence of organisational capacity, further render these people to be more affected by the impacts of flooding, and eventually renders them being less effective in dealing with the impact of recurrent flood disasters (DFID, et al., 1999). Now, to help these people affected by flood become more prepared for recurrent flood disasters, the Disaster Risk Reduction (DRR) project was initiated in Bangladesh in an effort to build their capacities and resilience (DFID, et al., 1999). The DRR project being implemented in Bangladesh has significantly demonstrated that increasing the resilience of poor people's livelihoods reduces their vulnerability to disaster risks, while at the same time contributing to poverty reduction and increasing their resilience (DFID, et al., 1999).

It is also important to note that the evidence of the impact of the DRR project in Bangladesh was used to influence the local systems, government officials and policy makers to be equally responsive to the needs of the rural poor. Community cohesion, capacity to make well-informed decision, and self-confidence among the poor communities in Bangladesh were significantly enhanced through the implementation of the DRR project (DFID, et al., 1999). Generally, this initiative has significantly described achievements in disaster risk reduction since the world conference on disaster reduction in Kobe in 2005, and makes significant advancement towards Hyogo Framework for Action 2005–2015 (DFID, et al., 1999).

3.9 Root causes of Community Vulnerability to flood

There are many reasons associated with community vulnerability to flood and people's vulnerability, and these depend of their coping capacity. It is important to understand that those who can cope easily with the effects of flood disaster are less vulnerable than those who cannot (International Centre for Water Hazard and Risk Management (ICHARM, 2008). The following issues have been identified as being the root cause of the vulnerability of flood-affected people:

- *“Settlement in the low-lying areas is directly associated with flood effect to the communities.*
- *The materials used to build houses, such as thatch and mud. These materials by their nature get easily damped within the first few days of exposure to stagnate flood waters.*
- *Continuous flooding reduces agricultural activities such as crop plantation and this promotes the vulnerability of the poor people further by focusing on other livelihood options such as fishing and in fact, this encourages many to cluster near the source of flooding for fishing purposes.*
- *Poor drainage networks in the area and narrow drainage streams of the flashy rivers accelerate the impact of flood to the communities settled in low laying areas” (ICHARM, 2008, pp. 1-30).*

3.10 Flooding in study area

Flooding in the Luhonono area is not caused by the excessive rainfall in the area, as is perceived by many (Mendelsohn & Roberts, 1997). The amount of rainfall that is annually received in the area cannot cause huge flooding of the study area. It is, therefore, essential to note that flooding is usually attributable to the huge amounts of rainfall that are received in the upper catchment areas of the Zambezi River, and this causes the Zambezi River to overflow, inundating villages as indicated in Figures 3.6 and 3.7 below.

There catchment areas include Southern Angola, Angola’s Lunda plateau and most notably North Eastern Zambia. Rainwater flows into the Zambezi River through different channels, such as the West Lunga and Kabompo Rivers, the Lungu-Bungo River, Luena River, and the Luanguinga and Lumbe Rivers (Mendelsohn & Roberts, 1997). The rainwater eventually gains velocity, travelling downwards over the Liuwa Plain and the Barotse plains in Western Zambia to Katima Mulilo in Namibia, the point where Namibia borders with Zambia. At this point, the rainwater begins to flow at a faster rate into the Zambezi River, and rises rapidly.

Due to the continuous and rapid increase in the levels of the water, the Zambezi River eventually spills over its banks and causes flooding of the Milapos¹⁰ and lower-lying parts of the Luhonono area close to the Zambezi River (Mendelsohn & Roberts, 1997). The water usually heads towards Lake Liambezi through different spillways (Milapos). Generally, the Luhonono area tends to be flooded over to such an extent that the community can only gain access to Katima Mulilo, the capital city of the Zambezi region, by crossing the Zambezi River using Mukoro¹¹ and boats, via Mwandia in Zambia, thanks to the agreement that exists between the Namibian and Zambian governments.



Figure 3.6 A village in Kabbe constituency in the Zambezi Region, submerged in floodwater in March 2008:

Source: (Erfani-Ghadim, 2008)

10 These are natural, informal water channels (spillways) through which flood water runs to the other lower-lying areas.

11 This is a traditional boat made out of a big trunk of a tree, usually manufactured in Zambia.



Figure 3.7 A school in Northern Namibia submerged in flood

Source: (Namibiansun, 2008)

3.11 Local knowledge on flood-related issues

In areas prone to floods, flood forecasting, early warning systems and community-based flood management can, to a large extent, save many lives and reduce losses to properties during and after the occurrence of a flood (ICHARM, 2008). It is, therefore, obligatory that any inclusive flood management plan in any country should take into consideration the existing knowledge of the local people usually affected by flooding, based on local physical conditions, history, local flood forecasting, early warning approaches, and most importantly, the flood trends (Deckens, 2007). This is important since the communities know the local environment, the geographical set up or patterns, the problems associated with floods and even possible solutions to such problems, better than the outsiders do (Osti, 2005) and (Osti, 2008).

In fact, whereas it is necessary to study existing local beliefs and practices for predicting, early warning, and management of flood in the functioning stage, it is equally essential to establish

that these are important and suitable, so as to a great degree be integrated in the disaster management plan (Osti, 2005) and (Osti, 2008). Thus, the local knowledge is the same in the whole study area (Luhonono), given the fact that only one ethnic group (the Masubia) exist in the study area.

3.12 Namibia National Disaster Risk Management Plan (NDRMP), 2011

Disaster risk management for Namibia is guided by the National Disaster Risk Management Policy (NDRMP) of 2009. The ultimate goal of the policy is to contribute meaningfully to the attainment of sustainable development in line with the envisaged Namibia's Vision 2030. This would be achieved through strengthening national capacities in order to significantly reduce disaster risk, and at the same time build resilience within the communities to disasters. The policy spells out the following essential objectives:

"1. Make disaster risk reduction a priority at all levels in Namibia by establishing sound, integrated, and functional legal and institutional capacity within the established National Disaster Risk Management System, to enable the effective application of the concept of total disaster risk management.

2. Improve risk identification, assessment and monitoring mechanisms in Namibia.

3. Reduce the underlying risk and vulnerability factors by improving disaster risk management applications at all levels.

4. Strengthen disaster preparedness for effective response and recovery practices at all levels.

5. Enhance information and knowledge management for disaster risk management." (National-Planning-Commission-of-Namibia, 2011, p. 19).

It is thus important to note that the five objectives as outlined above are the key and serve as the priorities for implantation of the NDRMP policy (2009) for Namibia and also for planning the major components in disaster management, such as prevention, preparedness, response and recovery. In addition to the policy on disaster risk management in Namibia, there are regional

and international agreements to which Namibia, as a state, is signatory. These include the following, as outlined in the Disaster Risk Management Plan of 2011, of the Republic of Namibia:

- *“The Hyogo Framework for Action (2005 – 2015) which outlines the various stages for action in disaster reduction including; making it a national and local priority, enhance early warning, reduce underlying risks and strengthening preparedness.*
- *Africa Regional Strategy for Disaster Risk Reduction (2004) which has as objectives to increase political commitment to disaster risk management, increase public awareness, improve governance, enhance knowledge and identification of disasters.*
- *Programme of Action to Implement the Africa Regional Strategy for Disaster Reduction (2006–2015) provides strategic guidance and direction to mainstream disaster risk reduction in sustainable development planning and processes.*
- *Article 25 of the SADC Protocol on Health, provides for integrated disaster risk management in the region.*
- *Multilateral Agreement between Namibia, Angola, Comoros, Madagascar and South Africa on Coordination of Maritime Search and Rescue Services. 2007.*
- *Article 2 of SADC Protocol on Politics, Defence and Security cooperation –I, enhance regional capacity in respect of disaster management and coordination of international humanitarian assistance” (National-Planning-Commission-of-Namibia, 2011, pp. 1-50).*

The institutional framework for disaster risk management in Namibia is arranged as follows:

- *“The president of the republic of Namibia – the president is authorised to declare a state of emergency. The state of emergency is pronounced to the international communities for assistance in responding to the unfolding occurrence of a disaster that is practically beyond the capacity of the government.*
- *Office of the prime Minister – in this framework, the office of the Prime Minister is mandated to coordinate risk management and implement the National policy on disaster management.*

- *Cabinet* – mandated to allocate resources, essential to implement disaster risk reduction activities, such as prevention, preparedness, response and recovery.
- *National disaster risk management committee* – the actual execution of the policy on disaster must be undertaken in full consultation and cooperation with the national disaster risk management committee and all structures throughout the country.
- *Directorate Disaster Risk Management* – coordination of disaster risk management and function along with the office of the Prime Minister.
- *Regional disaster risk management committee (13 regions)* – this forms the multi-stakeholder platform and is mandated with the actual coordination of disaster risk management amongst all stakeholders in a given region.
 - ❖ *Constituency disaster risk management committees (105 constituencies)*
 - ❖ *Local authorities disaster risk management system*
- *National Focal Persons Forum*” (National-Planning-Commission-of-Namibia, 2011, pp. 20-21).

3.13 Namibia Disaster Risk Management Act, 2012

The Act on disaster risk management, Act 10 of 2012, makes provision “*To provide for the establishment of institutions for disaster risk management in Namibia; to provide for an integrated and coordinated disaster management approach that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery; to provide for declarations of national, regional and local disasters; to provide for the establishment of the National Disaster Management Risk Fund; and to provide for incidental matters (Signed by the President on 1 August 2012)*” (Republic-of-Namibia, 2012, p. 2).

The protocol for disaster risk management in Namibia is clearly spelled out in Act 10 of 2012, available from the office of the Prime Minister of the Republic of Namibia at a cost of N\$20.00 (Republic-of-Namibia, 2012).

3.14 What the Government of the Republic of Namibia did/did not do with regard to floods in Namibia

Over 15000 people in the flood plains of the Zambezi (Caprivi) region were affected by floods between 2007 and 2009 (IFRCRCS, 2007). Many people were found trapped on small islands, and also clustered into makeshift camps. The government of Namibia, in collaboration with International Federation of Red Cross and Red Crescent Societies (IFRCRCS), provided relief aid to the affected people in the form of tents, blankets, food, water and water purification sachets (IFRCRCS, 2007).

The government of Namibia provided a helicopter and some boats to carry Red Cross relief materials to the isolated areas. This was necessitated by the visit made by the Red Cross official to Schuekmannsburg (Lunhonono) that revealed that a humanitarian crisis was likely if relief materials were not provided to the affected people as a matter of urgency (IFRCRCS, 2007). The major concerns that seem to have not been adequately addressed by the government of Namibia with regard to the affected people were the provision of adequate water supplies, sanitation, as well as there being insufficient tents to shelter the affected people, and medication (IFRCRCS, 2007). Regarding sanitation, both adults and children were using the bush to relieve themselves and there were no adequate water supplies.

The government could not provide transport for the affected people when they needed to go to Katima Mulilo town to purchase certain basic necessities, and the only way people could travel was by using canoes (Mukolo) made out of wooden materials to reach their intended destinations (IFRCRCS, 2007). *"The devastating floods that have been affecting the Caprivi area in Namibia have received very little media coverage"* (IFRCRCS, 2007, p. 2). In fact, this has implications in terms of drawing the attention of the international communities, since media coverage would trigger the international communities to provide support in order to prevent a humanitarian crisis.

Therefore, the lesson learned from this component in the Zambezi (Caprivi) region is to ensure capacity building through integrated education, training and public awareness programmes for

school principals in the region to enable the culture of disaster risk reduction among stakeholders in Namibia. In this regard, capacities development through workshops with the help of international organisations such Red Cross, United Nations Education Scientific Cultural Organisation (UNESCO) and the regional authorities could be a step forward in developing resilience to the affected communities (UNESCO, 2010).

3.15 Summary

In summary, the first component of this chapter focused on the different types of flooding as a natural disaster (particularly those that are evident in the Lushanono area) and this should have enabled the readers to better understand the complications. Particular attention in this chapter was given to the characteristics that make floods more distinct from other natural disasters. A further centre of attention that was expected to add significance to this chapter was the discussion of the Zambezi River Levels of the period 1965–2011 and rainfall per season over 2002–2011. The peak years were circled to show the differentiation and degree of impact to the community. The impacts of flooding on the livelihood of people, an overview of flood as a natural disaster, and flood risk resilience options for vulnerable rural communities have been discussed in detail in this chapter. In addition to the above-mentioned points of discussion, coping or resilience against flooding, economic benefits of flood, and the effect of flood in the developing countries of which Namibia is part has been discussed. The chapter gave a brief account of the disaster risk management in Namibia that is guided by the National Disaster Risk Management Policy (NDRMP) of 2009. The ultimate goal of the policy is to contribute meaningfully to the attainment of sustainable development in line with the envisaged Namibia's Vision, 2030. The chapter also gave a brief discussion with regard to the Disaster Risk Management Act, 10 of 2012.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This component of the study outlines the methodological and technical aspects that were used in this research.

4.2 Nature of the study

This study adopted both descriptive and exploratory designs. The former allowed for the description of a given phenomenon and the latter allowed for testing of relationships. An exploratory study enables the study to formally seek answers to problem questions by addressing the questions “why”, as opposed to questions such as “what”, “where”, “when” which are addressed by a descriptive approach. Descriptive research involves either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena. Descriptive research examines a situation as it is (Leedy & Ormrod, 2001). Therefore, the combination of these two designs enabled the study to describe the relationship(s) among given variables (Singleton, 2005); (Babbie, 2010). The study integrated both qualitative and quantitative research by collecting data for both.

4.3 Study population

The study focused on impacts of flooding on the livelihoods of the rural community in the Luhonono area, thus, the target study population for this study was all the heads of households, community leaders and government institutions in Luhonono. The Luhonono area is inhabited by a population of about 30 villages, a school and a health centre, with a total population of 800 households. The study was confined to the entire area and from the whole area, 12 affected villages were randomly selected from the 30 villages. From the selected villages, 169 households were randomly selected. The heads of the households comprised males (79) and females (90).

A sample of 169 households was determined from the total of 800 households residing in Luhonono area. The key informants were purposively selected at household level and community level, respectively, from the 800 households (Poggie, 1972) and (Seidler, 1974). Purposive sampling is based on the judgement of the researcher and the sample is made up of the elements that comprise the major characteristics, and is representation, of the entire population (Strydom, et al., 2005).

4.4 Sampling Method and sample size

The study applied both purposive simple and random sampling techniques. A purposive sampling technique was used in identifying and choosing the key informants. Unlike random sampling, non-probability methods, such as purposive sampling, are not free from bias. Informants may be chosen out of convenience or from recommendations of knowledgeable people (Smith, 1983). Non-probability methods contribute more to internal validity than external validity does. In purposive sampling, the interpretation of results is limited to the population under study.

Despite its inherent bias, purposive sampling can provide reliable and robust data. The strength of the method lies in its intentional choices (Bernard, 2002). The simple random sampling is the least sophisticated of all sampling designs. The sample is chosen by random selection, where every member of the population has an equal chance of being selected (Leedy & Ormrod, 2001). The size of the probability sample for this study was determined by using the following formula.

$$n = \frac{z^2 pqN}{E^2 (N-1) + z^2 pq}$$

Where **z** refers to the confidence level of the estimate (usually fixed at 1.96, corresponding to a 95 % confidence level), **pq** is the variance (that is unknown and then fixed at its maximum value: 0.25), **N** is the size of the population, **E** is the sampling error (often +_0.067).

Thus the sample = $(1.96)^2 (0.25) (800) / (0.067)^2 (800-1) + (1.96)^2 (0.25) = 768.32/4.547111$
=168.9 (which to the nearest number, since the study is focused on people) = 169 households. The sample size was decided given the fact that it represents a major component of the population. In verifying the sample size (using the above formula), a sample size calculator was used, available at www.dssresearch.com.

4.4.1 Research Instruments

The research used two types of research instruments; a questionnaire for collecting quantitative data, and an interview guide for collecting qualitative data. The questionnaire and the interview schedule, having all the parameters regarding livelihoods, were significantly developed.

4.4.1.1 Structured Questionnaire

The fundamental objective of a questionnaire in research is to gain information and views from people about a phenomenon on a particular issue (Babbie & Mouton, 2001). A structured questionnaire, comprised of closed and open-ended questions, was used to collect data from the participants. Questions were formulated based on the objectives of the study. In order to improve on the quality of the data that was collected, the questionnaire was field tested before it was used in the actual study. This was essential to determine the relevance and clarity of the questions and also to establish the amount of time that was taken to complete a questionnaire by an individual participant (Babbie & Mouton, 2001). Field testing the questionnaire was important for verifying the validity and reliability of the questionnaire. This was essential for assuring the quality of the data collection procedure. After field testing the questionnaire, errors identified were corrected and the questionnaire was personally administered to the participants by the researcher.

4.4.1.2 Interview guide

An interview guide was used to collect additional information and also to assist in validating information from the structured questionnaire. To conduct interviews to establish an

understanding of what people say about a phenomenon requires skills beyond those used in ordinary conversations (Rubin & Rubin, 1995). The interview guide was conducted purposively with the Community Development Committee, the area headman and the political councillor assigned to the Luhonono area (all being key informants) (Tremblay, 1957). Interviews were carried out individually. In order to avoid missing out information during the interviews, an enumerator was appointed to assist in capturing information during the interviews and a tape recorder was later not used, because of technical problems beyond the capacity of the researcher.

4.5 Data Analysis

Quantitative data from the household survey were subjected to descriptive statistics analysis wherein tables and graphs were used and frequencies were determined. *“Data are empirical representations of concepts and measurement links data to concepts”* (Neuman, 2006, p. 181). Cross tabulations were used in order to compare the relationships among variables. Qualitative data were analysed and also presented, based on the pre-determined themes, categories and pattern, into which data from the field was compounded. Chi-Square analysis was used to determine the relative overall effects of flooding in different villages.

4.6 Limitations

It is important to acknowledge that there were some challenges in conducting this study and that any research work has limitations (Thomas & Nelson, 1996). The major challenge was the dropping out of certain participants from process. It was also foreseen that the communities would initially be reluctant to accept the conducting of the study in their villages and much sensitisation to convince the communities was carried out prior to data collection. The sensitisation programme was carried out through the participation of the influential headman who was able to gather the entire community at the local community point, precisely under the tree where the communities normally conduct community meetings.

4.7 Ethical Considerations

Ethics is referred to as comprising the standards of conduct that guide people's decisions and behaviour (Jerald, 2008). In the present study, participants were informed about their participation and their consent to their voluntary involvement was obtained. The participants' privacy was treated confidentially; although names and addresses were required from the participants in case clarification might be required in future or during the analysis of the data. This ensures that the participants were protected from harm and ensures the confidentiality of the research data, and above all avoids deception of the participants. The participants were enlightened about the nature and purpose of the study. Permission was sought from the Ministry of Agriculture and Forestry (MAF) and the Traditional Authority (TA). Participants' contributions were acknowledged.

4.8 Conclusion

In conclusion, this study employed both quantitative and qualitative approaches. A questionnaire that comprised structured and open-ended items was used to collect primary data. The focus group guidelines were set and used during the focus group discussions in order to direct the discussions to attain the desired outcome. Secondary sources were used as consolidations. The analysis of the data was based on both primary and secondary data. The chapter gave an account of the limitations and ethical considerations that are essential for this study. The next chapter sets out the presentation and discussion of the results.

CHAPTER 5

RESULTS, INTERPRETATION AND DISCUSSION

5.1 Introduction

In the previous chapters, the theoretical components with regard to the impacts of flooding on the livelihoods of people residing in flood-prone areas, in the Luhonono area particular, have been discussed. To accomplish the objectives and testing the hypothesis of this study, the researcher carried out an extensive study in Luhonono area. Therefore, this chapter presents the quantitative and qualitative analysed results of the research conducted on 169 respondents and 5 key informant stakeholders in the Luhonono area. The analysed data is presented in the form of bar graphs, pie graph and tables in percentage and frequencies, where possible and applicable. Finally, the collected data is discussed.

5.2 Research Findings and Presentation

5.2.1 Demographic characteristics of the respondents

A total 169 households and 5 key informants, in total 174 respondents, took part in the study. Of the 169 households participating in this study, 53 per cent were headed by females and 47 per cent by males. It is thus important to note that the gender aspect in this study is significant, bearing in mind that disaster has an impact on gender, as well as on vulnerability in general. Data given in Table 5.1 below revealed that, overall, there are more female (53 %) respondents than male (47 %), and that divorcees and widows/widowers constituted more than 40 % of the respondents. This is supported by the study (thesis) conducted by (Rabaloa, 2010) “*of the social, psychological and economic impact of flooding in GA-Motla and GA- Moeka communities of Moretele district in North West province of South Africa*”, where the majority (60 %) of the respondents were females, and males only 40 %. The study area, according to the results of the study, is well represented by females who seem to be especially vulnerable to flood, since they have lesser capacity to withstand the impacts of flooding when a flood occurs. Generally, women are usually very vulnerable to disaster, especially when they are single, since they lack support from males who have the strength to escape the devastating impact of any disaster, and at the same time their ‘*livelihood*’ is seriously affected (Fordham, 1998). The

study revealed that married respondents constituted 43 %, while the rest were single (15 %). However, this refutes the results that were revealed in (Rabaloa, 2010) is his study “*of the social, psychological and economic impact of flooding in GA-Motla and GA- Moeka communities of Moretele district in North West province of South Africa*” which pointed out that the majority (72 %) were single (in that study area). The results of this study revealed that the Luhonono area is composed of a majority of people who are married, and have the ability to assist themselves in cases of floods striking. This information might be instrumental in persuading donors/governments to decide to provide aid to the populations.

Table 5.1 Demographic distribution of respondents and statistics

	GENDER			RESPONDENT'S MARITAL STATUS				
	Males	Females		Single	Married	Divorced	Widowed	
Chunga	6	9		3	6	3	3	
Ilukena	6	9		0	2	6	7	
Lisulo	3	3		0	2	3	1	
Luhonono	4	8		6	3	1	2	
Mbile	8	7		1	8	4	2	
Muliwa	3	9		3	2	5	2	
Muyapekwa	10	8		3	9	2	4	
Nalisa	7	9		1	13	2	0	
Nkanza	8	4		1	6	2	3	
Simana	7	9		2	8	5	1	
Sinengela	9	6		4	9	1	1	
Tomu	8	9		2	4	6	5	
	79	90	169	26	72	40	31	169
	47 %	53 %	100 %	15 %	43 %	24 %	18 %	100 %

The household size was also considered in this study, which established that 75 % of the respondents had household sizes of between 1–5 dependents. This has been supported by (Muhammad, et al., 2003) in their study of the impact of flooding on the livelihoods and food

security of rural communities. Their case study in Southern Punjab, Pakistan, reported that the majority of the respondents indicated that the household sizes were less than 5, representing 70 % of the respondents. This is also seen in the study conducted by (Rabaloa, 2010) in his work “*on social, psychological and economic impact of flooding in GA-Motla and GA- Moeka communities of Moretele district in North West province of South Africa*”, which revealed that 56 % of the households were composed of 3–5 family members. This trend was also observed by (Mwape, 2009) in her study of “*an impact of floods on the socio-economic livelihoods of people: A case study of Sikaunzwe community in Kazungula district of Zambia*” (Thesis), where the majority (63 %) of the household had family groups of 3–6. This seems to be the actual average of family members in most African settings, giving the perception that it is relatively easy for them to support each family member of the household with regard to food and other essentials, such as clothing, blankets, shelter, portable water and school needs. This will also make it relatively easy for the service providers to provide resources for the needs of affected people during flooding. The household size is mostly 0–5 children, but there are about 24 % of the respondents who have six to ten children (Table 5.2 below). This means (from the table below) that, on average, each family has 4 children. However, outliers were noted but would not affect this average significantly. Table 5.2 below shows the variations that exist among the family members in the study area.

Table 5.2 Distribution of household size in Luhonono area

Household Size	1-5	6-10	11-15	Over 15
Number of Households	126	41	1	1
Percentage	75 %	24 %	1 %	1 %

5.2.2 Literacy

The education level of the respondents was also considered, with the majority (70 %) having formal education up to grade 12 level. This implies that the majority of the respondents have the ability to comprehend information regarding the impact of flood very well, when exposed to information in documents, media and through working group-sharing meetings. The literacy rate among the respondents seems to be quite high, considering that more than 75 % of them

attained Grade 8 or above. This indicates that the literacy level is adequate in the study area. In the study conducted by (Rabaloa, 2010), it was revealed that the majority (48 %) had access to schooling, giving the impression that these school-going children have the education, through their school curriculum, required for understanding the devastating impacts of a disaster, especially those that might be caused by flooding. Figure 5.1 below shows the distribution of respondents according to the literacy levels in percentages of the interviewed 169 respondents.

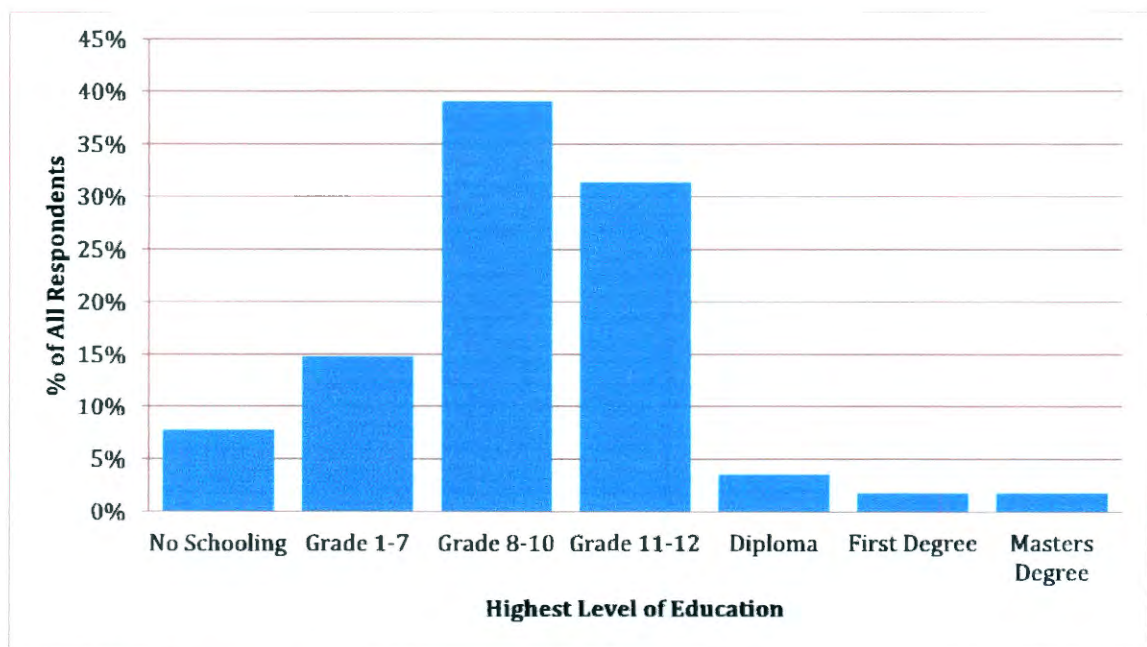


Figure 5.1 Distribution of literacy rates of households in Luhonono area

5.2.3 Age Analysis

The age of the respondents was also taken into consideration to determine whether the majority of the respondents were old, thus needing special attention as far as aid, support and evacuation processes are concerned. It was established that the majority (43 %) were between 31 to 40 years old, and only between 2 to 5 per cent of the respondents were 61 years old and above (Figure 5.2 below). This trend in age distribution was observed in (Mwape, 2009) in her study of *“an impact of floods on the socio-economic livelihoods of people: A case study of Sikaunzwe community in Kazungula district of Zambia”* (Thesis), which revealed that most of the respondents in that study were aged between 30 and 34. Table 5.3 below shows the distribution

of respondents, classified according to age groups for the 12 villages. The data clearly revealed that the majority of the respondents were between the ages of 21 to 50. It is thus important to note that old aged people and children are more vulnerable to natural hazards, like flood, than are the middle aged (18–50 years) members of the community. This age group is more active, and strong enough to escape the dangers of flooding. Age was investigated in this study to determine the degree of assistance required and how many people are likely to be affected by flood who have weak resilience, should extensive flooding strike.

Table 5.3 Age distribution of the households in Luhonono area

VILLAGE	Below 20	21-30	31-40	41-50	51-60	61-70	Over 70
Chunga		5	7	2			1
Ilukena	1	1	5	7	1		
Liselo		1	3	1	1		
Luhonono		4	1	3	1	1	2
Mbile	1	4	5	4	1		
Muliwa		4	5	3			
Muyapekwa		4	9	3		2	
Nalisa		3	10	1	2		
Nkanza		3	6	3			
Simana		2	10	4			
Sinengela		4	7	3	0	1	
Tomu		2	7	4	3	1	

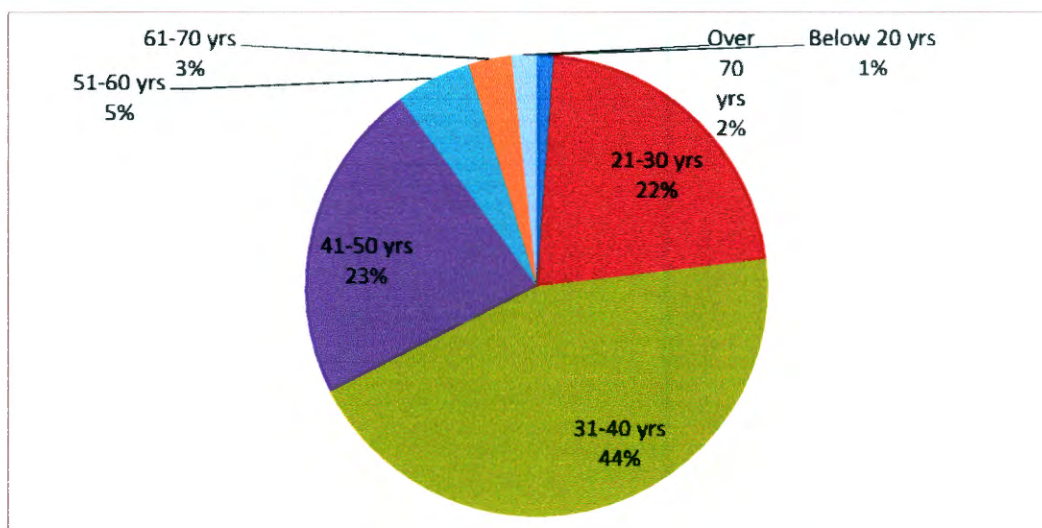


Figure 5.2 Overall age distribution of the respondents

5.2.4 Severity

Table 5.4 Observed values of effects on households

	Number of Respondents	OVERALL EFFECT	
		Not Severe	Severe
Chunga	15	2.9	12.1
Ilukena	15	0.4	14.6
Liselo	6	1.6	4.4
Luhonono	12	4.0	8.0
Mbile	15	3.6	11.4
Muliwa	12	2.9	9.1
Muyapekwa	18	8.3	9.7
Nalisa	16	3.6	12.4
Nkanza	12	3.4	8.6
Simana	16	4.0	12.0
Sinengela	15	3.3	11.7
Tomu	17	5.3	11.7
	169		

Test 1: Chi Square test

H_0 : There is no association between the village and the overall severity – (That is, the severity of the floods was uniform across all villages).

H_a : There is association between the village and the overall severity of the floods – (That is, the severity of the floods was most uniform across all villages).

Table 5.5 Expected values (relative overall effect)

	RELATIVE OVERALL EFFECT		
	Not Severe	Severe	
Chunga	3.8	11.2	15.0
Ilukena	3.8	11.2	15.0
Liselo	1.5	4.5	6.0
Luhonono	3.1	8.9	12.0
Mbile	3.8	11.2	15.0
Muliwa	3.1	8.9	12.0
Muyapekwa	4.6	13.4	18.0
Nalisa	4.1	11.9	16.0
Nkanza	3.1	8.9	12.0
Simana	4.1	11.9	16.0
Sinengela	3.8	11.2	15.0
Tomu	4.3	12.7	17.0
	43.1	125.9	169.0

$$\chi^2_{\text{calculated}} = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}} = 9.3$$

$$\chi^2_{\text{statistic}} = \chi^2_{(0.05,11)} = 19.675 \text{ at 5 per cent level of significance}$$

Hence, we do not reject H_0 and conclude that there is no association between the village and overall severity. This means that all the villages were equally affected by the floods. There might be a notion that some of the villages included in the survey are affected more by the

floods than others because of slight differences in geographical setup, such as higher altitude or proximity to Zambezi River. This was the essence of the test, and in accordance with the conclusion set out above, there seems to be no difference in the intensity of the floods among the villages.

Relative effects

As noted in Table 5.5 above, the sample sizes were not the same for the villages, and set out below is a summary which shows the relative severity of the floods among the villages. Therefore, to answer the objectives of this study on the impact of flooding on the livelihoods of the people living in the Luhonono area, the study arrived at the following findings. Significant to this study was the fact that people who were affected by floods in the Luhonono area during the period referred to in this report were the only sources of data which reveal the real extent of the impact caused by flooding in the study area. The respondents were asked about the impact of floods on their livelihood, specifically. From the study findings, it was revealed that the relative affect, overall, was that the majority (74 %) of the respondents indicated that flooding severely affected the community, while only 26 % of the respondents were not severely affected by flooding, in the Luhonono area. The results of this study also revealed that floods diverted more severely in one or more of the crops, livestock, water, child education, livelihood or dwelling. However, it was noted that crops (95 %), water quality, livelihood (82 %) respectively, and child education (88 %) were the elements most affected, forcing the community to migrate to safer places. This was also observed in (Mwape, 2009) in her study of *“an impact of floods on the socio-economic livelihoods of people: A case study of Sikaunzwe community in Kazungula district of Zambia”* (Thesis), where the majority (94 %) stated that their crops were seriously damaged by flood. Therefore, this entails that these components need considerable attention for aid or any humanitarian support.

Table 5.6 Relative effects

		Relative Overall Effect	
		Not Severe	Severe
Chunga		19 %	81 %
Ilukena		3 %	97 %
Liselo		26 %	74 %
Luhonono		33 %	67 %
Mbile		24 %	76 %
Muliwa		24 %	76 %
Muyapekwa		46 %	54 %
Nalisa		22 %	78 %
Nkanza		29 %	71 %
Simana		25 %	75 %
Sinengela		22 %	78 %
Tomu		31 %	69 %

Test 2: Chi Square test

Table 5.7 Observed values

	Moderate/ Not Severe	Severe
Effect on:		
Crops	9	160 (95 %)
Livestock	36	133 (71 %)
Water Quality	30	139 (82 %)
Child Education	20	149 (88 %)
Livelihood	30	139 (82 %)
Dwelling	34	135 (78 %)

H_0 : The floods diverted equally severely between the crops, livestock, water, child education, livelihood and dwelling.

H_a : The floods diverted more severely in the crops, livestock, water, child education, livelihood or dwelling.

Table 5.7a Effect On Crops

	Not Severe	Severe
Chunga	0	15
Ilukena	0	15
Liselo	0	6
Luhonono	2	10
Mbile	1	14
Muliwa	0	12
Muyapekwa	0	18
Nalisa	0	16
Nkanza	3	9
Simana	3	13
Sinengela	0	15
Tomu	0	17
	9	160

Table 5.7b Effect On Livestock

	Not Severe	Severe
Chunga	0	15
Ilukena	0	15
Liselo	0	6
Luhonono	4	8
Mbile	7	8
Muliwa	0	12
Muyapekwa	4	14
Nalisa	4	12
Nkanza	0	12
Simana	3	13
Sinengela	9	6
Tomu	5	12
	36	133

Table 5.7c Water Quality

	Not Severe	Severe
Chunga	2	13
Ilukena	0	15
Liselo	1	5
Luhonono	3	9
Mbile	0	15
Muliwa	3	9
Muyapekwa	7	11
Nalisa	0	16
Nkanza	5	7
Simana	3	13
Sinengela	2	13
Tomu	4	13
	30	139

Table 5.7d Effect On Child Education

	Not Severe	Severe
Chunga	1	14
Ilukena	0	15
Liselo	2	4
Luhonono	2	10
Mbile	0	15
Muliwa	1	11
Muyapekwa	8	10
Nalisa	0	16
Nkanza	5	7
Simana	0	16
Sinengela	0	15
Tomu	1	16
	20	149

Table 5.7e Effect On Livelihood

	Not Severe	Severe
Chunga	0	15
Ilukena	0	15
Liselo	0	6
Luhonono	2	10
Mbile	0	15
Muliwa	1	11
Muyapekwa	12	6
Nalisa	1	15
Nkanza	0	12
Simana	6	10
Sinengela	1	14
Tomu	7	10
	30	139

Table 5.7f Effect On Dwelling

	Not Severe	Severe
Chunga	2	13
Ilukena	0	15
Liselo	2	4
Luhonono	3	9
Mbile	3	12
Muliwa	3	9
Muyapekwa	9	9
Nalisa	5	11
Nkanza	3	9
Simana	0	16
Sinengela	1	14
Tomu	3	14
	34	135

Table 5.8 Effect of flood

	Moderate/ Not Severe	Severe	Total
Effect on:			
Crops	26.5	142.5	169
Livestock	26.5	142.5	169
Water Quality	26.5	142.5	169
Child Education	26.5	142.5	169
Livelihood	26.5	142.5	169
Dwelling	26.5	142.5	169
Total	159	855	1014

$$\chi^2_{\text{calculated}} = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}} = 23.25$$

$$\chi^2_{\text{statistic}} = \chi^2_{(0.01,4)} = 15.09 \text{ at 1 per cent level of significance}$$

Hence, we reject H_0 and conclude that floods diversted more severely in one or more of the crops, livestock, water, child education, livelihood or dwelling. It can be noted that crops and child education were the most affected. There might be a notion that the floods affect the livelihoods in the same way, with the same intensity. This test was conducted to verify this and, as in the conclusion noted above, the effect of floods seems to impact more on some areas of livelihood than others, more especially on child education, water and livestock. The effect might not be very much pronounced in crops, as compared with other livelihoods, because the community depends more on fishing and livestock.

5.2.5 Relocation to other high areas

The aspect of opting to be relocated was investigated in this study and it is apparent that 84 % of the respondents opted for relocation, albeit with a sense of reservation attached to such option, and 16 % felt that relocation is not a solution at all (Table 5.9 below). Though the majority (84 %) opted for relocation, with a sense of reservation, these people still have doubts regarding the whole process of relocation. The majority (84 %) indicated that with the severity and frequency of the floods, it might be very necessary to relocate these affected families to high ground areas, but there are other facts to consider. One of the major concerns, according to the respondents, was that people living in these areas have been in the area for a long time and they regard the area as being where they have originated from. They have a fear that if they leave the area, their land will be taken over by other settlers, especially those from the neighbouring Zambia who are believed to be fishermen. However, out of the 169 respondents, the majority preferred, should this be acceptable, to be relocated in areas such as New Lusese, Bukalo and Salambala, respectively, while a small margin of the respondents preferred to be relocated to other areas, such as New Kabbe and Sikuzwe, respectively (Table 5.9 below). It was stated during the interactions with the participants that those areas are more suitable, given

the fact that access to government services, such as health, communication, transport (good roads) and, above all, the education of their children, is conveniently easy.

The villagers seem to like and accept the effects of flooding, considering the fact that flooding brings additional economic benefits, such selling fish, for which there is a very good market in the nearby areas (Mwandi¹²) across the Zambezi in Zambia. Furthermore, the supply of relief food from government and non-governmental organisations, such as Red Cross Society, boost their ability to reject the proposal for relocation. One other benefit, as mentioned by the respondents (with no statistical data), is that flooding results in more natural food being produced, despite causing damages to their crops. Therefore, the study has revealed that since most of the families in these areas are low-income families, relocation might signal more problems for them, as their present life (as in past lifetimes) depends largely on the local natural resources, such as fish and other aquatic¹³ resources. However, it is important to acknowledge that relocation would likely improve their livestock, as well as their educational and sanitation needs. Access to other villages and towns is likely to improve through a relocation drive. In concluding this component, it must be noted that to attain this, sensitisation drives and education need to be strengthened. It must be mentioned that essential services and provision of significant infrastructure, such as roads and electricity, should be part of their (community) vocabulary.

12 A settlement area on the bank of the Zambezi in Zambia. This area is adjacent to Luhonono area, just across the Zambezi River. People in Luhonono area frequently visit the place easily, given the fact that the governments of Namibia and Zambia have reached a bilateral agreement for the communities in the two areas to cross using the border passes obtainable at the mini-police stations situated in both places.

13 Include wetlands, streams, rivers, and groundwater essential for the community survival.

Table 5.9 Distribution of responses of respondents with regard to relocation

Village	Relocation		Number of respondents wishing to relocate to						
	Yes	No	New Kabbe	New Lusese	Bukalo	Sikanjabuka	Silumbi	Salambala	Sikuzwe
Chunga	15	0	0	8	10	7	5	8	6
Ilukena	15	0	0	2	3	4	4	4	0
Lisulo	4	2	0	2	0	1	0	2	0
Luhonono	6	5	0	3	3	0	2	1	0
Mbile	15	0	0	5	8	4	1	6	0
Muliwa	11	0	1	8	4	6	2	5	0
Muyapekwa	13	5	4	7	2	7	0	3	0
Nalisa	16	0	1	9	6	8	0	10	0
Nkanza	8	4	1	3	5	0	2	2	0
Simana	12	4	0	2	2	0	2	2	0
Sinengela	11	4	0	3	5	2	2	1	0
	14	3	2	3	3	0	3	4	0
	140	27	9	55	51	39	23	48	6
	84 %	16 %							

5.2.6 Coping strategies used by affected villages out of 169 respondents

With regard to the coping strategies of the respondents, the study revealed that households adopted different coping strategies to the impacts of flooding. The coping strategies used by the respondents affected by flooding in the Luhonono area, as reflected in Table 5.10 below, include fishing (88 %), trading (86 %), selling of livestock (86 %), selling mats and baskets (85 %), previous crop harvesting (41 %), government relief (82 %) and makeshift camps (93 %). It was established that the majority of the respondents (93 %) prefer the makeshift camps as the best coping strategy during periods of flood period, followed by fishing (88 %), selling mats and baskets, and selling livestock (86 %), respectively. According to the respondents, when people are in the makeshift camps they are provided with most basic amenities, such as food, clothing, blankets and shelter, by the government and other organisations such as the Red Cross. This is believed to be the best opportunity and driving force to obtain such amenities, since most rural people have a low economic status and lack the capacities to purchase such needed amenities. It was also established in this study that 88 % of the respondents regarded fishing as the second most essential coping strategy during flooding periods (Table 5.10 below). It is believed that fishing brings the most income in the shortest possible time and the money they obtain from selling fish can be used to meet other household needs, such as those that are not supplied by the government and other organisations such as the Red Cross.

The study has revealed that 86 % of the respondents, as shown in table 5.10 below, believe that selling cattle to other people and to the Meat Cooperation of Namibia, as well as trading with each other, are considered to be the third and fourth essential components of their survival, respectively. However, it was also established that 82 % of the respondents felt that government relief has been the other best coping strategy during periods of flooding. Surprisingly, 2 % of the respondents indicated that loans, in the form of short-term cash loans, were able to help them to cope with the effects of flood. The small amount of money they might borrow from a neighbour could help them to meet certain emergency needs, like paying for health services and transport fees to other places, especially boat fees to cross the Zambezi River into Zambia when they need health services and also for visiting relatives and friends in the nearby Mwandi commercial town in Zambia, adjacent to Luhonono area.

Table 5.10 Distribution of respondents according to their coping strategies

Village	Fishing	Trading	Loans	Selling Of Livestock	Mats And Basket	Previous Crop Harvesting	Government Relief	Makeshift Camps
Chunga	15	14	0	14	14	11	15	15
Ilukena	15	15	0	15	15	2	15	15
Lisulo	6	6	0	6	6	1	6	6
Luhonono	10	11	0	11	11	1	11	12
Mbile	6	7	0	7	7	2	7	11
Muliwa	12	12	0	12	12	9	12	12
Muyapekwa	17	17	2	16	15	12	13	16
Nalisa	9	8	0	9	8	9	9	14
Nkanza	11	12	1	12	12	5	12	12
Simana	16	15	0	15	15	3	13	14
Sinengela	15	12	0	15	14	7	11	14
Tomu	17	16	1	14	15	7	15	17
	149	145	4	146	144	69	139	158
	88 %	86 %	2 %	86 %	85 %	41 %	82 %	93 %

5.2.7 Government efforts in reducing the effects of flood and root causes of vulnerability

The majority (69 %) of the respondents, as shown in the bar chart in Figure 5.3 below, agree that the government of the Republic of Namibia have made significant contributions through the provision of flood education training programmes to the community in the Luhonono area, with the aim of increasing and capacitating their resilience. However, 29 % of the respondents do not know of such programmes taking place in their area, while the rest of the respondents (2 %) seem to be undecided.

The respondents in the study area were also queried with regard to the assistance the government of Namibia provides to the affected people during floods, and 43 % indicated that the government does not provide any assistance to them during flooding, whereas a further 43 % revealed that they agree that the government is assisting them during flood periods by increasing their resilience through providing them with food and other essential amenities. Fourteen per cent do not know anything regarding this aspect relating to government assistance. With regard to the issue of a long-term plan that the government of Namibia has regarding assisting the people affected by flooding in the Luhonono area, the majority (50 %) disagree with regard to the existence of such plans, while 14 % revealed that they are aware (agree) of such plans, and the rest do not know, representing 36 % of the respondents.

High population density adds to flood severity, and this aspect relates to the component of vulnerability (Figure 5.3 below). It is important to understand that vulnerability concerns refer to the '*shocks*', '*adverse trend*' and '*unfavorable seasonal patterns*' that affect the livelihood of the communities (Ashraf, et al., 2013, pp. 751-758). In fact, all these factors can have a significant impact on livelihoods and eventually on the capabilities of the communities to sustain themselves through income generation activities (Kabir, et al., 2012). It is important to understand that heavy floods have promoted vulnerability among the community in the Luhonono area.

Therefore, similar observations regarding vulnerability of livelihood assets and flooding were earlier described by (Kabir, et al., 2012). Hence, it was established in this study regarding community vulnerability to flood that the majority (42 %) of the respondents disagree that the high density of people near the Zambezi River increased their vulnerability to flood, while 40 % agree that such density of people residing near the Zambezi River increased their vulnerability to flood, citing the fact that the sand content of the Zambezi River has increased remarkably, making the river very much shallower than usual, thus rendering it easily filled up with flood water that descends from the upper catchments in Zambia's Northern province (Figure 5.3 below). However, 18 % do not know, or have no idea, about this aspect. The shallowness of the Zambezi River has resulted remarkably in early over-spilling of its banks, unlike 10 years ago when the Zambezi River was deeper. With regard to the component of poverty accelerating the vulnerability of people to flood, the majority (45 %) disagree with the proposition that poverty renders people more vulnerable to flood, while 23 % agree that poverty plays a major role with regard to flood vulnerability, and the rest (32 %) do not know about, or lack knowledge regarding, this aspect. With regard to families with no alternative livelihoods, 43 % disagree, while the majority (48 %) of the respondents agree, that families with no livelihood options in Luhonono area are more affected by flooding, and 9 % do not know of or lack understanding of this aspect (Figure 5.3 below).

Table 5.11 Distribution of respondents' opinions on selected issues

	Strongly Disagree	Disagree	Don't know	Agree	Strongly Agree
Government provide flood education to villagers	1 %	1 %	29 %	25 %	45 %
Government provide flood assistance	26 %	16 %	15 %	26 %	17 %
Government has long term plans with affected villages	26 %	24 %	36 %	12 %	2 %
High Population density adds to flood severity	23 %	19 %	18 %	26 %	14 %
Does poverty add to the severity of the floods	28 %	17 %	32 %	8 %	15 %
Alternative livelihood in times of floods	34 %	9 %	9 %	30 %	17 %

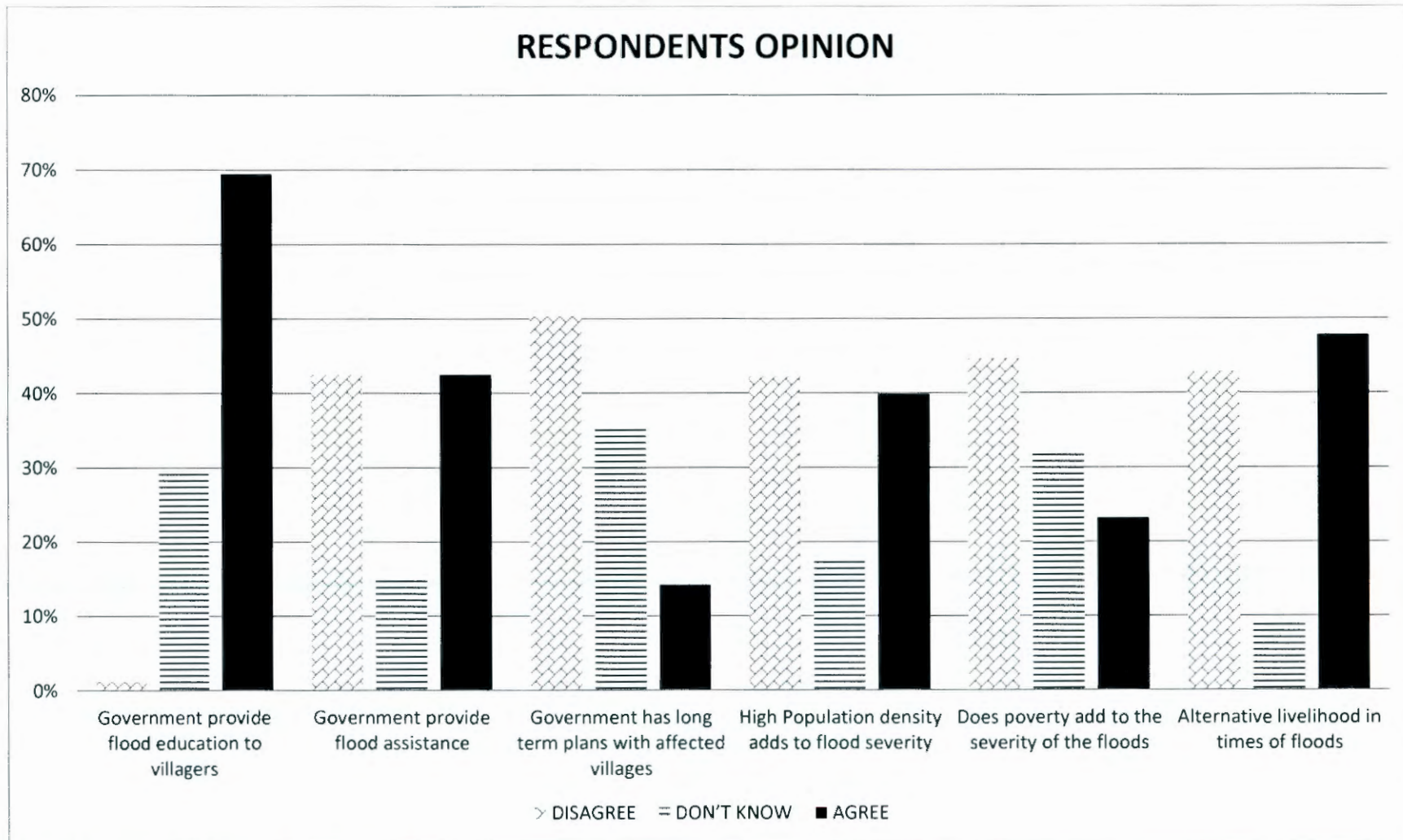


Figure 5.3 Respondents' opinions on selected issues

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The present study has revealed that flooding has impacted on the livelihood assets of the community in the Luhonono area, and also promotes the prospects of starvation (food insecurity). Crops and animal farming, which have been the necessary and significant assets for their sustainable livelihoods, have been severely affected. In this regard, it can be confidently concluded that the livelihoods of the flood victims have been, to a great degree, pushed backwards several years in their progress and eventually this situation will make them work hard for their resilience.

In this regard, the key interviewees and the questionnaire answers indicate that the major sources of livelihood in Luhonono community were crop production, cattle ranching, wild fruits, weaving, fishing and other aquatic resources. With a closer look at the responses, it was worth noting that fishing, crop production and cattle ranching are the major sources, although there is a significant contribution made from weaving reeds and other aquatic activities. With regard to the effects and impacts of the floods on their livelihood, the study concluded that the roads were badly damaged and access to and from neighbouring villages and town was severely affected, while contact with the clinics, and the school in particular, became almost impossible.

Where possible, people resorted to the use of canoes as a form of transport but this form of transport is quite undependable, especially for long distances. The study revealed that classrooms, books, chairs and other educational materials were destroyed, and that families lost their household property. It is worth noting that some of the respondents pointed out that the majority of the families are from low-income groups, which makes life for them even more miserable without access to the natural resources which the families are used to. The floods swept almost away all the crop fields which have been the base of their livelihoods, while most of the livestock died because of the lack of adequate pastures.

Apart from obtaining meat from the livestock and money from the sales thereof, the households also depend heavily on milk; hence, this loss of livestock had a double, if not triple, impact on their livelihood. Sanitation and water issues triggered high incidences of water-borne diseases, as toilets were swept away and water sources were heavily contaminated with human waste. With regard to the option of relocating households to high ground areas, the study concluded that, with the severity and frequency of the floods, it might be necessary to relocate these affected families to high ground areas, but that there are other facts to consider. The people living in these areas have been in this area for a long time and now regard this area as where they originate from.

They have the fear that if they leave this area, their land will be taken over by other settlers, especially those from the neighbouring Zambia. The villagers seem to be used to the effects of floods, considering that there is a very good market for fish in Mwandji, Zambia, and they also benefit from relief programmes provided by government and non-governmental organisations, like the Red Cross Society. Most of the families in these areas, as indicated earlier in this study, are low-income families and relocation might signal more problems, as their past and present life depends largely on the local natural resources, like fish and other aquatic resources. However, relocation is, to a great degree, likely to improve their livestock, as well as their educational and sanitation needs. Access to other villages and towns is likely to improve through a relocation drive.

With regard to assistance from government and other organisations, the study concluded that the government of Republic of Namibia is keen to improve the livelihoods of these re-settled people, since some households are offered transport to relocate and building materials to start a new life after resettlement. The study also revealed that some respondents noted that others are indeed getting assistance through building materials and food, if they do accept the call by the government of Namibia to relocate. The community also obtains assistance for the duration of the flood period in the form of food, blankets, mosquito nets, and water purification pills, as well as temporary accommodation and sanitation to the most affected,

where they accept the call from the government of Namibia to shift into the makeshift camps¹⁴(temporary campus).

In consolidating the responses from the households, the feedback from the key informants of this study, amplified similar sentiments, revealed that fishing, crop production and cattle ranching are the most important resources, although there is a significant input from weaving reeds and other aquatic activities. The general effect, as referred to by the key informant, is that classrooms, books, chairs and other educational materials were destroyed, while families lost their household property to a great extent. With regard to assistance from the government of the Republic of Namibia, the community also obtains backing in the form of food, blankets, mosquito nets, and water purification pills, as well as temporary accommodation and sanitation for the most affected.

6.2 Recommendations

On the basis of the findings of this study, the following recommendations are made:

- The Government of the Republic of Namibia should step up the relocation drives (considering the willingness of the affected people), linked to positive incentives which would be a long-term solution, unlike the temporary provision of utilities during times of flooding.
- Part of the population resisted relocation, pointing out some hereditary issues and that the land is likely to be taken over by foreigners. The land is very unlikely to be taken over by foreigners, considering the sound immigration policy of the Republic of Namibia. Hence, this should not be an excuse for turning down relocation by certain of the respondents. It must be mentioned that the affected communities need to be consulted by the government of the Republic of Namibia, instead of imposing decisions on them, as imposing decisions on them will not yield positive outcomes in this regard. There is a proverb by the Masubia people:

¹⁴ The temporary camps where flood-affected people are settled for the whole period of the flooding. Usually made out of tents that can easily be removed.

“You cannot take a hippopotamus¹⁵ from the river, get-up-and-go it into the forest for it to live there far from water” (Mubusisi, 2014). This proverb typically means that the people of Masubia, and those residing in the Luhonono area in particular, are more inclined to water areas and they believe that life on the high grounds (dry/forest areas), where water is problematic, is unthinkable.

- From above proverb, community engagements and consultations aligned with the necessary education drive regarding the impacts of flooding, and the need for relocation with much expression of willingness, should form part of the strategy that the government of the republic of Namibia should apply in winning the consent of the affected community.
- The tests carried out in this study showed that all the villages have been hit equally by the floods, meaning that in the case of relocation (considering the willingness of the affected people) or aid, all the villages are in equal need. However, it can be noted that aid is a priority in form of crop and livestock protection, flood food relief, essential amenities, and that child education should be at the top of the government’s agenda in an effort to build resilience and capacity within the community.
- There is no urgent need for health support, though it is necessary.
- The Government of the Republic of Namibia may also seek to improve the fishing sector and other sources of livelihood within the community so that people might become self-sustaining and better protected, should the floods hit again.
- Consultations with the affected communities soon after flooding is essential, with the understanding of establishing first hand sight information with regard to the impact the previous flood as caused to the people’s livelihood.
- The Government of the Republic of Namibia may seek to educate people about essential components that are related to floods (especially the dangers associated with residing very close to the banks of the River, in this regard the Zambezi River), this will help to cultivate resilience to flood in the communities.

¹⁵ An herbivorous type of an animal associated to intensive survival in or near water and commonly grass at night. Very common animal in Luhonono area. .

- The Government of the Republic of Namibia should provide maximum assistance to people affected by floods, with the aim of minimising loss of human and livestock lives and also damages to properties that are needed by the communities to cope with floods.
- Long-term plans in dealing with floods need to be put in place by the Government of the Republic of Namibia with an effort to establish the mitigation strategies that are needed in managing floods.
- Based on the results of this study, the Government of the Republic of Namibia may seek to facilitate (if not by itself) further research studies in areas such as relocation of the affected communities to the higher ground (to establish why the majority are resisting to be relocated), livelihood improvement strategies (potential community projects) and provision of essential basic amenities to the communities during the flood periods.
- Further studies would need to be carried out with an effort to develop baseline data that will help the Government of the Republic of Namibia to establish the strategies that will help the communities in flood prone areas to develop resilience against the impact of flood.

References

- Abah, J., Mashebe, P., Ubwa, S. & Onjefu, A., 2015. Assessment of consumers' exposure to vegetable dietary nitrate in Katima Mulilo, Namibia. *Journal of Applied Chemistry*, pp. 29-34.
- Abdellatti, H. et al., 2003. *Livelihoods and Climate Variability*, Khartoum: Higher Council for Environment and Natural Resources.
- Adger, N. et al., 2005. Social-Ecological Resilience to coastal disasters.. *Science*, 12 8, 309(5737), pp. 1036-1039.
- Adger, W., 2006. *Global Enviromental Change*. [Online] Available at: www.elsevier.com/locate/gloenvcha [Accessed 19 5 2015].
- Allison, E. H. & Ellis, F., 2001. *The livelihoods approach and management of small-scale fisheries*. [Online] Available at: [http://dx.doi.org/10.1016/S0308-597X\(01\)00023-9](http://dx.doi.org/10.1016/S0308-597X(01)00023-9) [Accessed 2014].
- Allison, E. H. & Ellis, F., 2001. *The livelihoods approach and management of small-scale fisheries*. [Online] Available at: http://www.transparentsea.co/images/8/8a/Allison_and_Ellis_%282001%29.pdf[Accessed 20 11 2014].
- Ashraf, S. et al., 2013. Impacts of flood on livelihoods and food security of rural communities: A case study of Southern Punjab, Pakistan. *Pak. J. Agric. Sci*, pp. 751-758.
- Babbie, E., 2010. *The Practice of Social Research*. 12th Edition ed. s.l.:Wadsworth Cengage Learning.
- Babbie, E. & Mouton, J., 2001. *The Practice of Social Research*. Cape Town: Oxford University Press..
- Banerjee, L., 2007. *Flood Disasters and Agricultural Wages in Bangladesh*.. Oxford: Blackwell Publishing.
- Bernard, H., 2002. *Research Methods in Anthropology: Qualitative and quantitative methods*.. 3rd Edition ed. California: AltaMira Press.

Blaikie, P., Wisne, B., Terry, C. & Davis, I., 1994.

http://www.preventionweb.net/files/670_72351.pdf. [Online]

Available at: http://www.preventionweb.net/files/670_72351.pdf [Accessed 10 11 2014].

Brooks, N., 2003. *Vulnerability, risk and adaptation: a conceptual framework*. Tyndall Centre Working Paper 38. , Norwich: Tyndall Centre for Climate Change Research, University of East Anglia.

Brouwer, R., Akter, S., Brander, L. & Haque, E., 2007. Socio-Economic Vulnerability and Adaption of Environmental Risk: A case study of climate change and flooding in Bangladesh.. *Journal*, 27(2), p. 33.

Bryant, E., 1991. *Natural Hazards*.. New York: Cambridge University Press.

Cannon, T., Twigg, J. & Rowell, J., Not Dated. http://ipcc-wg2.gov/njlite_download.php?id=6377. [Online] Available at: http://ipcc-wg2.gov/njlite_download.php?id=6377 [Accessed 20 5 2015].

Carney, D., 1998. *Sustainable Rural Livelihoods: What Contribution can we make?*, s.l.: DFID.

Chambers, R. & Conway, G., 1992. *Sustainable Rural Livelihoods*. 1st Edition ed. Brighton: University of Sussex.

Changnon, S., 2003a. Shifting Economic Impacts from Weather Extremes in the U.S.: A Result of societal Canges, not Global Warming.. *Natural Hazards*, Volume 29, pp. 273-290.

Changnon, S., 2005. The 1993 Flood's Aftermath: Risk, Root Causes, and Lessons for the future.. *Jounranl of Contemporary Water Research and Education*, pp. 70-75.

Changnon, S. & Kunkel, K., 2001. Causes for the Record High Flood Losses in the Midwest.. *Water International*, Volume 26, pp. 223-230.

Christensen, A. & Pozarny, P., 2008. www.fao.org/easypol. *Social -Economic and Livelihoods Analysis in Investiment Planning: Key Principles and Methods*. [Online] Available at: [htt://www.fao.org/easypol](http://www.fao.org/easypol). [Accessed 13 5 2005].

Deckens, J., 2007. *The Snake and River Don't Run Staright*., s.l.: International Centre for Integrated Mountain Development, p76.

- Dey, B. & Singh, R. B., 2006. *Natural Hazards and Disaster Management*. Dehli: Central Board of Secondary Education.
- DFID, 1999. <http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf>. [Online] Available at: <http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf> [Accessed 20 5 2015].
- DFID, 1999. <http://www.ennonlin.net/pool/files/ile/dfid-sustainable-livelihoods-guidance-sheet-section1.pdf>. [Online] [Accessed 20 6 2014].
- DFID, Foster, J., Greer, J. & Thorbecke, E., 1999. <http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf>. [Online] Available at: <http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf> [Accessed 20 11 204].
- Dixit, A., 2003. Floods and Vulnerability: Need to rethink flood management. *Journal*, 159(2), pp. 41-45.
- Dochasnetwork, 2010. <http://dochasnetwork.wordpress.com/2010/08/03/pakistan-floods-lessons-learned-from-other-flooding-disasters/>. [Online] Available at: <http://dochasnetwork.wordpress.com/2010/08/03/pakistan-floods-lessons-learned-from-other-flooding-disasters/> [Accessed 20 11 2013].
- Dow, K., 1992. Exploring Differences in our Common Future (s): The Meaning of Vulnerability to Global Environment Change. pp. 417-436.
- Ellis, F., 1999. <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2881.pdf>. [Online] Available at: <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2881.pdf> [Accessed 24 5 2015].
- Emergency-events-databasa, 2011. <http://geo-development.blogspot.com/2011/07/resources-emergency-events-database.html>. [Online] [Accessed 20 11 2013].
- EnvironmentLaw, 2008. www.environmentlaw.org.uk/rte.asp?id=99. [Online] [Accessed 3 5 2015].
- EPA, 2013. <http://epa.gov/climatechange/glossary.html>. [Online] Available at: <http://epa.gov/climatechange/glossary.html> [Accessed 20 5 2015].
- Erfani-Ghadim, N., 2008. <https://ifrc.org/en/news-and-stories/africa/namibia-red-cross-brings-emergency-assistance-to-flood-victims/>. [Online]

Available at: <https://ifrc.org/en/news-and-stories/africa/namibia-red-cross-brings-emergency-assistance-to-flood-victims/>[Accessed 2 5 2015].

eschooltoday, 2010. <http://eschooltoday.com/natural-disasters/floods/what-causes-floods.html>.

[Online] Available at: <http://eschooltoday.com/natural-disasters/floods/what-causes-floods.html>[Accessed 3 5 2015].

Ezemonye, M. N. & Emeribe, C. N., 2011. Flood Characteristics and Management Adaptations in Parts of the Imo River System. *Ethiopian Journal of Environmental Studies and Management*, 4(3), pp. 56-64.

Fordham, M., 1998. Making women visible in disaster: Problematising the private domain.. *Disasters*, 22(2), pp. 126-143.

Foster, H., 1980. *Disater Planning: Prevention of Life and Property..* States of America: Springer.

Geography-GCSE, Not Dated. <http://croesy-gcse-geography.doomby.com/pages/rivers.html>.

[Online] Available at: <http://croesy-gcse-geography.doomby.com/pages/rivers.html>[Accessed 20 5 2015].

Gordon, M. & Spoon, C., 2011. <http://patimes.org/lessons-learned-2011-flooding-thailand/>.

[Online] Available at: <http://patimes.org/lessons-learned-2011-flooding-thailand/>
[Accessed 20 5 2015].

Grunfest, E., 1995. *Hydro meteorological, impacts and Management of Extreme floods*, s.l.: s.n.

Gwimbi, P., 2004. *Flood Hazard Impact and Mitigation Strategies in Disaster Prone Areas of Muzarabani District (Zimbabwe): Exploring the Missing Link*. Ossrea, Addis Ababa., Harare: s.n.

Gwimbi, P., 2004.

http://publications.ossrea.net/index.php?option=com_sobi2&sobi2Task=sobi2Details&sobi2Id=210&Itemid=0. [Online] Available at:
http://publications.ossrea.net/index.php?option=com_sobi2&sobi2Task=sobi2Details&sobi2Id=210&Itemid=0[Accessed 20 5 2015].

Gwimbi, P., 2009. <http://www.jamba.org.za/index.php/jamba/article/viewFile/16/16>. [Online]

Available at: <http://www.jamba.org.za/index.php/jamba/article/viewFile/16/16>
[Accessed 20 5 2015].

- Gwimbi, P., 2009. <http://www.jamba.org.za/index.php/jamba/article/viewFile/16/16>. [Online] Available at: <http://www.jamba.org.za/index.php/jamba/article/viewFile/16/16> [Accessed 24 5 2015].
- Hossain, A., 2003. http://www.apfm.info/publications/casestudies/cs_bangladesh_full.pdf. [Online] Available at: http://www.apfm.info/publications/casestudies/cs_bangladesh_full.pdf [Accessed 21 5 2015].
- ICHARM, I. C. f. W. H. a. R. M., 2008. <http://www.preventionweb.net/english/professional/publications/v.php?id=9286>. [Online] Available at: <http://www.preventionweb.net/english/professional/publications/v.php?id=9286> [Accessed 20 11 2014].
- IFRCRCS, I. F. o. R. C. a. R. C. S., 2007. *Namibia Floods: A case of forgotten Disaster*, s.l.: s.n.
- IISD, I. I. f. S. D., 2003. *Livelihoods and Climate Change: Combining disaster risk reduction, natural resource management and climate change adaptation in a new approach to the reduction of vulnerability and poverty*, s.l.: s.n.
- International-Labour-Organization, 2006. www.bdsknowledge.org. [Online] [Accessed 20 11 2014].
- Jerald, G. a. R. A., 2008. *Behavior in Organization*. 9th Edition ed. s.l.:Prentice Hall.
- Jha, A. K. B. R. & Lamond, J., 2012. *Unserstanding Flood Impacts*, Washington DC: Thw World Bank.
- Jones, T. & Dieckmann, U., 2013. *Caprivi Region: "Scraping the Pot" San in Namibia Two Decades after Independence*, Windhoek: s.n.
- Kabir, M., Hou, X. & Akther, R. W. J. W. L., 2012. *Impact of small enterprenueurship on sustainable livelihood assests of rural poor women in Bangladesh.*, Blangladesh: s.n.
- Kirchhoff, C. J. & Bulkley, J. W., 2008. Sustainable Water Management in the Zambezi River Basin. 15(2).
- Krantz, L., 2001. http://www.sida.se/contentassets/bd474c210163447c9a7963d77c64148a/the-sustainable-livelihood-approach-to-poverty-reduction_2656.pdf. [Online] Available at:

http://www.sida.se/contentassets/bd474c210163447c9a7963d77c64148a/the-sustainable-livelihood-approach-to-poverty-reduction_2656.pdf[Accessed 20 5 2015].

Krantz, L., 2001. *The sustainable livelihood approach to poverty reduction*. SIDA, s.l.: Division of Policy and Socioeconomic Analysis.

Kulig, J., 2000. Community Resiliency: The potential for community health nursing theory development.. *Public Health Nursing*, 17(5), pp. 374-385.

Lawal, J. O., Omonona, B. T. & Oyinleye, O. D., 2011. *Effects of Livelihood Assets on Poverty Status of Farming Households in Southwestern Nigeria*, s.l.: EAAE.

Leedy & Ormrod, 2001. *Practical Research: Planning and Design*. New Jersey, USA: Prentice-Hall.

March, R., 2003. *Working with Local Institutions to support Sustainable Livelihoods*, Rome: FAO.

Mendelsohn, J. .. & Roberts, C., 1997. *An Environmental Profile and Atlas of Caprivi*., s.l.: Directorate of Environmental Affairs.

Morse, S. & McNamara, N., 2013.

<http://www.springer.com/social+sciences/population+studies/book/978-94-007-6267-1>.
[Online] Available at: <http://www.springer.com>[Accessed 20 11 2014].

Mubusisi, G., 2014. *Mr* [Interview] (20 11 2014).

Muhammad, L. et al., 2003.

http://www.academia.edu/5671143/IMPACTS_OF_FLOOD_ON_LIVELIHOODS_AND_FOOD_SECURITY_OF_RURAL_COMMUNITIES_A_CASE_STUDY_OF_SOUTHERN_PUNJAB_PAKISTAN. [Online] [Accessed 15 5 2015].

Mwape, Y., 2009. *An impact of floods on the socio-economic livelihoods of people: A case study of Sikaunzwe community in Kazungula district of Zambia (Thesis)*, Bloemfonten: Universty of the Free State.

Namibiansun, 2008.

<http://search.myway.com/search/AJimage.jhtml?searchfor=+Namibiansun%2C+2008+food+in+oshakati&ts=1432811198279&p2=%5EZ%5Exdm008%5ETTAB02%5Ena&n=781b41b2&ss=sub&st=tab&ptb=C3EF31A2-9B4A-4C0F-A068-30CEADBCF126&si=C12pu8yJ1cUCFUsOwwodBhIANg&tpr=sbt>. [Online] Available

[at:http://search.myway.com/search/AJimage.jhtml?searchfor=+Namibiansun%2C+2008+flood+in+oshakati&ts=1432811198279&p2=%5EZ%5Exdm008%5ETTAB02%5Ena&n=781b41b2&ss=sub&st=tab&ptb=C3EF31A2-9B4A-4C0F-A06830CEADBCF126&si=CI2pu8yJ1cUCFUsOwwodBhIANg&tpr=sbt](http://search.myway.com/search/AJimage.jhtml?searchfor=+Namibiansun%2C+2008+flood+in+oshakati&ts=1432811198279&p2=%5EZ%5Exdm008%5ETTAB02%5Ena&n=781b41b2&ss=sub&st=tab&ptb=C3EF31A2-9B4A-4C0F-A06830CEADBCF126&si=CI2pu8yJ1cUCFUsOwwodBhIANg&tpr=sbt) [Accessed 2 5 2015].

Namibiasun, 2014.

<https://www.google.com.na/search?q=Kabbe+constituency+map&biw=1890&bih=931&tbm=isch&imgil=4OoYsGX0SpDWPM%253A%253BrqqMiJqi0eZoZM%253Bhttp%25253A%25252F%25252Fwww.namibiansun.com%25252Fdisasters%252>. [Online] [Accessed 20 11 2014].

National-Planning-Commission-of-Namibia, 2011.

https://www.ifrc.org/docs/IDRL/NATIONAL_DISASTER_RISK_MANAGEMENT_PLAN_2011.pdf/http://www.lac.org.na/laws/2012/5029.pdf. [Online] Available at: https://www.ifrc.org/docs/IDRL/NATIONAL_DISASTER_RISK_MANAGEMENT_PLAN_2011.pdf/http://www.lac.org.na/laws/2012/5029.pdf [Accessed 30 6 2014].

Neuman, W., 2006. *Social Research Methods: Qualitative and Quantitative Approaches*. 6 ed. USA: Pearson Education, Inc..

Noji, E., 2005. "Indian Ocean tsunami. Public Health issues in Disaster.". *Care Med.* 33, pp. 29-33.

Odero, K., 2006. Information capital: 6th asset of sustainable livelihood framework.. *Discovery and Innovation*, 18(2), pp. 83-91.

Oni, O., 2014. *Livelihood, Agro Ecological Zones and Poverty in Rural Nigeria*. [Online] Available at: <http://dx.dio.org/10.5539/jas.v62p103> [Accessed 19 5 2015].

Open-Africa, 2014. www.openafrica.org. *caprivi wetlands paradise route*. [Online] [Accessed 18 5 2015].

Osti, R., 2005. Indigenous practices on water harvesting in semi-arid environment of Nepal.

Osti, R. T. S. a. T. T., 2008. Flood Hazard Mapping in Developing Countries.

Pelling, M., 2003. *The Vulnerability of Cities: Natural Disasters and Social Resilience*, London: Earthscan.

Poggie, J., 1972. Toward Quality control in key informant data.. *Human Organization*, Volume 31, pp. 23-30.

- Poolman, J., 2012. <http://www.namibiansun.com/content/national-news/flood-woes-mount>. [Online] Available at: <http://www.namibiansun.com/content/national-news/flood-woes-mount>[Accessed 2 5 2015].
- Purvis, J., 2002. *Fish and Livelihoods: Fisheries on the eastern floodplains, Caprivi*, Windhoek: DEA Research Discussion paper.
- Purvis, J., 2002. *Fish and Livelihoods: Fisheries on the eastern floodplains, Caprivi*, s.l.: s.n.
- Rabaloa, R., 2010. *The social, psychological and economic impact of flooding in GA-Motla and GA- Moeka communities of Moretele district in North West province, South Africa*, Bloemfontein: University of the Free State.
- RedR, 2013. <http://www.unisdr.org/we/inform/events/26303>. [Online] Available at: <http://www.unisdr.org/we/inform/events/26303>[Accessed 20 5 2015].
- Reliefweb.int/map/namibia/namibia-flooding, 2009. <http://reliefweb.int/map/namibia/namibia-flooding-accessibility-health-clinics-caprivi-katima-and-kabe-constituencies-1>. [Online] [Accessed 20 9 2013].
- Reliefweb, 2008. <http://www.reliefweb.int/glossaries>. [Online] Available at: <http://www.reliefweb.int/glossaries>[Accessed 20 5 2015].
- Republic-of-Namibia, 1998. *National Disaster Plan.*, Windhoek: Office of the Priminister.
- Republic-of-Namibia, 2009. *Flood: Post-Disaster need assessment*, Windhoek: Republic of Namibia.
- Republic-of-Namibia, 2011. *National Planning Commission: Namibia 2011 population and Housing census, preliminary results.*, Windhoek: National planning Commission of Namibia.
- Republic-of-Namibia, 2012. *Disaster Risk Management Act 10 of 2012*, Windhoek: OPM- Office of the Priminister Namibia.
- Rolfe, R., 2006. *Social Cohesion and Community Resilience: A Multi-Disciplinary Review of Literature for Rural Health Research. Department International Development Studies, Faculty of Graduate Studies and Research.*, Saint Mary's University: Halifax, NS.
- Rose, A., 2004. Defining and Measuring Economic Resilience to Disaster.. *Disaster prevention and Management*, 13(4), p. 30714.

- Rubin, H. & Rubin, I., 1995. *Qualitative Interviewing. The Art of Hearing Data.* London: Sage.
- Scoones, I., 1998. *Sustainable Rural Livelihoods: A Framework for Analysis*, Brighton: Institute for Development Studies..
- Secretariat, P. C., 2007. *Tools for Mainstreaming Disaster Risk Reduction: Social Impact Assessment.*, Switzerland: s.n.
- Seidler, J., 1974. On using informants: a technique for collecting quantitative data and controlling measurement error in organization analysis.. *American Sociological Review*, Volume 39, pp. 816-831.
- Singh, K., 2014. Application of Pressure and Release (PAR) Model for Assessing Vulnerability to Industrial Hazards in District Bathinda. 3(5), pp. 25-29.
- Singh, N. & Gilman, J., 2002. Making Livelihoods more Sustainable.. *International Social Science Journal*, 51(162), pp. 539-545.
- Singh, N. & Kalala, P., 1995. *Adaptive Strategies and Sustainable Livelihoods: Community and Policy Studies for Burkino Faso, Ethiopia, Kenya, South Africa and Zimbabwe.*, Manitoba: International Institute for Sustainable Development..
- Singleton, R. J. a. S. B., 2005. *Approach to Social Research*. 4th Edition ed. Oxford: Oxford University Press.
- Smith, K. & Ward, R., 1998. *Floods – Physical process and human impacts*. England: John Wiley & Sons.
- Smith, T., 1983. On the validity of inferences from non-random sample.
- SPC, APF & SEIEA, 2015. *Baseline Report for integrated land-use planning (IRLUP) Zambezi region, Namibia*, Windhoek: Ministry of Lands and Resettlement.
- Start, D. a. J. C., 2004. *Livelihood Options? The Political Economy of Access Opportunity and Development*, London: s.n.
- Start, D. & Johnson, C., 2004. <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2470.pdf>. [Online] Available at:<http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2470.pdf>[Accessed 24 5 2015].
- Strydom, H., B., F. C. & Delpont, C., 2005. *Research at Grassroots for Social Sciences and Human Service Professions*. 3rd Edition ed. s.l.:s.n.

- Thomas, J. & Nelson, J., 1996. *Research Methods in Physical Activity*. USA: Human Kinetics.
- Tremblay, M., 1957. The key informant technique: a nonethnographic application.. *American Anthropologist*, Volume 59, pp. 699-701.
- Trosper, R., 2002. Northwest coast indigenous insititutions that supported resilience and sustainability.. *Ecological Economics*, Volume 41, pp. 329-344.
- UNDP, 2002. *Reducing Disaster Risk: A Challenge of Development*. [Online]
[Accessed 4 11 2013].
- UNDP, 2008. *International Strategy for Disaster Reduction: Linking Disaster Risk Reduction and Poverty Reduction. Good Practices and Lesson Learned*., Bangkok: A Publication of the Global Network of NGOs for Disaster Risk Reducation.
- UNESCO, U. N. E. S. C. O., 2010. *Lesson Learned in Emergency Preparedbess- Educational Flood Response and Shard Good Practices (Caprivi, Namibia)*, Windhoek: UNESCO.
- UNICEF, 2004. *UNICEF*. [Online]
Available at: <http://www.unicef.org/infobycountry/namibia-namibia-floods.html>[Accessed 20 5 2015].
- UN, U. N., 2000. *Sustainable Flood Prevention. Meeting of Parties to the Convention on the Protection on use of the Transboundary Water Courses and International Lakes*., Europe: United Nations.
- Vaz, C., 2000. *Coping with floods: The experience of Mozambique*.. [Online]
[Accessed 11 5 2015].
- Vlachos, E., 1995. *Socioeconomic Impacts and Consequences of Extreme floods*., Colorado: Sociology Department, Colorado State University.
- Walker, I. & Dolan, A., 2004. Understanding Vulnerability of coastal communities to climate change and related risks.. *Journal of Coastal Research*, p. SI 39.
- Ward, R., 1978. *Floods: Focal Problems in Geography: A geogographical Pesrspective*.. London: The Macmillan Press Ltd.
- Webdesk, 2014. www.namibianewsdigest.com/10619. [Online]
Available at: www.namibianewsdigest.com/10619[Accessed 20 5 2015].

- Weidlich, B., 2010. <http://www.hewsweb.org/floods/flood.asp?FID=194708>. [Online] Available at: <http://www.hewsweb.org/floods/flood.asp?FID=194708> [Accessed 20 5 2015].
- Wisner, B., Blaikie, P., Cannon, T. & Davis, I., 2004. *At Risk: Natural hazards, people's vulnerability and disasters*. 2nd Edition ed. New York, USA: s.n.
- Woo, H. & Kim, W., 1997. Floods on the Han River in Korea.. *Water International*, 22(4), pp. 230-237.
- Wright, J., 1996. Effects of Flood on National Policy: Some Achievements, Major Challenges Remain.. *In the great flood of 1993*, pp. 245-275.
- www.caprivi.biz/flood.htm, 2012. www.caprivi.biz/flood.htm. [Online] [Accessed 20 11 2013].
- Zahran, S. et al., 2008. Social Vulnerability and the Natural Built Environment: A model of flood casualties in Texas.. *Journal*, 32(4), pp. 537-560.
- Zakaria, M., 2011. <http://archive.thedailystar.net/newDesign/news-details.php?nid=197343>. [Online] Available at: <http://archive.thedailystar.net/newDesign/news-details.php?nid=197343>. [Accessed 21 5 2015].

APPENDICES

Appendix 1: Household Introduction and Questionnaire

Introduction

Attached is a questionnaire drafted by the researcher, Mashebe Percy Mashebe for the purpose of exploring the impact of floods on the rural livelihood of people living in flood prone areas of Luhonono community in the Zambezi region of Namibia. This is in partial fulfilment for the requirements of the masters' degree in Disaster and Risk Management.

You are kindly requested to fill in the questionnaire to assist with the information that will help the researcher to explore and identify the impact of floods on the rural livelihood of people living in flood prone areas of Luhonono community in the Zambezi region of Namibia. Once identified and analysed, the information will help to find ways of developing plans to cope with floods that affect the livelihood of people living in flood prone areas of Luhonono community.

The information obtained will be treated in confidence and only essential for this research.

Your cooperation is greatly appreciated. Thank you in advance.

Yours Faithfully

Mashebe Percy Mashebe

(Researcher)

Household Questionnaire

Section A: Demographic Characteristics of Household

1. Name of the Village

2. Gender of head of the household

	Options	
1	Female	
2	Male	

3. Marital status of head of the household

	Options	
1	Single	
2	Married	
3	Divorced	
4	Widowed	
5	Other	

Specify other

4. Age of respondent

	Options	
1	Below 20 years	
2	21 to 30 years	
3	31 to 40 years	
4	41 to 50 years	
5	51 to 60 years	
6	61 to 70 years	
7	Over 70 years	

5. Number of people in household

	Options	
1	1 to 5	
2	6 to 10	
3	11 to 15	
4	Above 15	

6. Highest level of education of respondent

	Options	
1	No schooling	
2	Grade 1 – 7 (primary level)	
3	Grade 8 – 10 (JSC)	
4	Grade 11 – 12 (Matric)	
5	Tertiary (Certificate/Diploma)	
6	Bachelors/First degree	
7	Post graduate/Masters' degree	
8	Doctorate (PhD)	
9	Other (Specify)	

Specify other

Section B: Livelihood Characteristics

7. The main sources of livelihood for your family?

	Options	
1	Crop production	
2	Livestock production	
3	Fishing	
4	Others(specify)	

Specify other

8. Main sources of food available for the family?

	Options	
1	Maize meal	
2	Milk	
3	Fish	
4	Others(specify)	

9. What was the effect of the flood on the following components in 2012?

	Components	No Effect	Moderate	Severe
1	Crop			
2	Livestock			
3	Health			
4	Water quality			
5	Children education			

10. How was the impact of flood on your livelihoods in 2012 flood?

	Options	
1	No Effect	
2	Moderate	
3	Severe	

11. What was the impact of the floods on the dwelling you live in 2012?

	Options	
1	No Effect	
2	Moderate	
3	Severe	

12. What are your flood-induced coping strategies in your area?

	Options	
1	Fishing	
2	Trading and selling of other goods in nearby places	
3	Obtaining short term loans from social contacts	
4	Selling of livestock	
5	Weaving of mats and basketry from reeds	
6	Dependence of food from previous crop harvest	
7	Dependence of food from government flood relief	
8	Resettlement into make-shift camps	

Specify other

13. Do you think permanently relocating you from the flood-prone areas to the higher grounds would be a solution in improving your livelihood?

	Options	
1	Yes	
2	No	
3	I do not know	

14. Are you willing to be relocated from the prone flood areas to the higher grounds of the Kabbe constituency of the Zambezi region to anywhere in the region?

	Options	
1	Yes	
2	No	
3	I do not know	

15. If the answer to question 13 is **YES**, which of the following areas of the higher grounds of the Zambezi region under the Masubia traditional authority to which you are part would you prefer to be relocated to?

	Options	
1	New Kabbe	
2	New Lusese	
3	Bukalo settlement	
4	Sikanjabuka area	
5	Silumbi area	
6	Salambala area	
7	Sikuzwe area	

Specify other

16. If the answer to question 13 is **NO**, specifically give precise reasons as to why you are not willing to be relocated from the flood prone area to the high grounds.

Section C: Government efforts to reduce the effects of floods

According to your experience and knowledge of floods in the Luhonono area, answer the following questions by ticking the applicable box (**Please tick the applicable box**)

Question		Strongly Disagree	Disagree	Don't Know	Agree	Strongly agree
1	The government educate people about floods in Luhonono area					
2	The government give assistance to people affected by floods in Luhonono area					
3	The government has put in place long-term plans to deal floods in Luhonono area					

Section D: Root Causes of Vulnerability to floods

Question		Strongly Disagree	Disagree	Don't Know	Agree	Strongly agree
1	Families living very close to the Zambezi river in Luhonono area suffer more from floods					
2	Poor people in Luhonono area are more affected by floods than those who are not poor.					
3	Families with no alternative livelihood(s) in Luhonono area are more affected by floods.					

“Thank you very much for your time”

Appendix 2: Key-informant Introduction and Interview guide

Introduction

Attached is a questionnaire drafted by the researcher, **Mashebe Percy Mashebe** for the purpose of exploring the impact of floods on the rural livelihood of people living in flood prone areas of Luhonono community in the Zambezi region of Namibia. This is in partial fulfillment for the requirements of the masters' degree in Disaster and Risk Management.

I am hereby requesting your time to have an interview with you to find out information that will help to explore and identify the impact of floods on the rural livelihood of people living in flood prone areas of Luhonono community in the Zambezi region of Namibia. Once identified and analysed, the information will help to find ways of developing plans to cope with floods that affect the livelihood of people living in flood prone areas of Luhonono community.

The information obtained will be treated confidentially and only for the purpose of this research.

Your cooperation is greatly appreciated. Thank you in advance.

Yours Faithfully

Mashebe Percy Mashebe
(Researcher)

Interview guide

The following topics were used as guidelines for the focus group discussions:

1. What are the major livelihood sources of the communities residing in Luhonono area?
2. What are the major effects of flood on the livelihood of the community residing in Luhonono area?
3. How was the impact of flood on the livelihoods of the communities in Luhonono in 2012 flood?
4. In your opinion, why do you think the communities in Luhonono area not willing to be relocated permanently to the higher grounds?
5. What efforts did the government made to have the people relocated permanently to the higher grounds?
6. What thought of assistance does the government and other non-governmental organisations provide to the community of Luhonono area during flood period in order to improve livelihood?
7. In your opinion, do you think relocating people permanently from the flood-prone areas to the higher grounds would be a solution in improving the livelihood of the affected people?
8. What strategies would you suggest will improve the livelihood of the communities in Luhonono area since flood is likely every year?

“Thank you very much for your time”