

https://dspace.org/

Vulnerability to climate variability in Botswana 1972-2002

Babugura, Agnes A

2006-02-08
http://hdl.handle.net/10539/160

Downloaded from a DSpace repository. https://dspace.org/

STATEMENT OF ORIGINALITY

The research work contained in this thesis was conducted between February 2002 and May 2004. It is original work except where due reference is made. It has not been and shall not be submitted for the award of any degree or diploma to any other institution of higher learning.

Signature…….

ACKNOWLEDGEMENTS

First, I would like to thank God for bringing me this far and for giving me the wisdom, the courage and the strength to go on.

I would like to acknowledge my gratitude to every one who gave encouragement, advice and assistance.

I thank my supervisor Professor C. Vogel for her continued support and guidance throughout this work. Despite her hectic schedules (teaching, research, meetings, raising a family) she has managed to find time to guide me through this research. I am very grateful and I appreciate her enthusiasm and interest in my work.

Special thanks are extended to all the respondents. Without your cooperation this work would not have been completed. I appreciate all your efforts.

Very special thanks to my parents Dr and Mrs. Babugura and my in-laws Dr and Mrs. Magembe for all their support and encouragement. Without them I would not have come this far. Thank you for helping look after my beloved daughter Lisa while I did my work.

Thanks to my Brothers Alex and Donald, to my sisters Christine, Doreen and Celia for their support. I am very grateful for all your assistance. Thank you all for being there when I needed you. Thank you for keeping my beloved daughter Lisa company when she really needed it. Knowing that she was happy and being entertained allowed me to do my work in peace.

Khamarunga, Mr and Mrs Munthali, Maria Kiire and Gina, thank you so much for all your support. I will be forever grateful.

To START, thank you very much for the award and a great opportunity to attend the International Young Scientist Conference on Global Environmental Change.

Finally, I would like to thank my beloved husband for his continuous support, motivation and encouragement.

DEDICATION

This thesis is dedicated to my daughter Lisa and my husband Steve. They have been my inspiration and motivation throughout this work. I love you both.

PREFACE

This study focuses on vulnerability to climate variability in Botswana. The study examines vulnerability of rural societies and the configuration of forces that shape their ability to cope and adapt to climate variability. The research was sponsored by START. START is a non-governmental, non-profit organization that seeks to establish and foster regional networks of collaborating scientists and institutions in developing countries.

Over the three years of writing my PhD, I had the opportunity to attend the First AIACC (Assessment of Impacts and Adaptation to Climate Change) Regional workshop and open meeting for Africa and Indian ocean Islands. This workshop was held in South Africa, in the year 2003. I also attended the International START Young Scientists Conference on Global Environmental Change, which took place in Trieste, Italy in 2003. In 2004, I had the opportunity to attend the Norway + SAVI workshop held in Johannesburg, South Africa. From these workshops and conferences I have gained valuable insights into vulnerability assessment.

In 2002, I was awarded a START scholarship, which included tuition and research. This is a highly recognized scholarship that is awarded to selected young scientists. I was also selected by START to present a paper at the International START Young Scientist Conference on Global Environmental Change, which was held in Trieste, Italy in November 2003. Currently I am in the process of preparing a paper for publication.

ABSTRACT

Due to increasing rapid environmental change, coupled with changes in social, economic and political conditions, vulnerability assessments have become increasingly important for understanding society's capacity to deal with such changes. The aim of this research is to examine vulnerability of rural societies as well as the configuration of forces that shape their ability to cope and adapt to climate variability. The study compares two rural societies living in different climatic regions in Botswana. These are, the southwestern part, which has the driest climate and the northern part, which has the wettest climate. This detailed study will help us understand how different societies and individuals, living under different climatic conditions, shape their livelihood systems to buffer against climate variability.

Historical analysis, secondary sources, questionnaires, participatory rural appraisal and observation are some of the methods used to capture data. The study demonstrated that climate variability has had various impacts on the communities of Matsheng and Kasane. In an attempt to cope with the impacts of climate variability, various mechanisms are used. These include, reliance on government assistance, temporary migration, reduced number of meals eaten per day, engagement in labour for cash or in-kind, formal employment and prostitution. Several constraints were found to affect coping and adaptation strategies in Kasane and Matsheng. These constraints include, poverty, HIV/AIDS, unemployment, gender inequality and environmental factors. The study also demonstrated that female-headed households are the most vulnerable to climate variability. Vulnerability of female-headed households can mainly be attributed to poverty and inequality.

In conclusion, the study provides knowledge based on peoples experiences, which will help planners and policy makers to come up with more effective measures for reducing vulnerability to climate variability and possible future changes in climate. The knowledge will also contribute to understanding the process of social adaptation to past and current climatic conditions.

TABLE OF CONTENTS

STATEMENT OF ORIGINALITY... ……i

ACKNOWLEDGEMENTS…….……..……...ii

DEDICATION…….…….……iv

PREFACE ……..…….……..…….v

ABSTRACT …….……..……...……vi

LIST OF FIGURES……..……..…….xii

LIST OF TABLES ……...……..……xiii

LIST OF ACRONYMS……..……....xiv

CHAPTER ONE

INTRODUCTION TO THE STUDY ……...…1

1.1 Introduction……..……..……... ……..1

1.2 Study Background….……..……1

1.3 Problem Statement ……7

1.4Objectives …….……8

1.5 Research Questions ……..10

1.6 Country Profile……...10

1.6.1 Location…….……...10

1.6.2 Vegetation and Soil……...…12

1.6.3 Natural Resources……12

1.6.4 Population……13

1.6.5 Economy……14

1.7 Thesis Structure. ……..…….15

CHAPTER TWO

LIVING WITH CLIMATE VARIABILITY, ADAPTATION AND COPING...……...……..16

2.1 Introduction …….……..……...…….16

2.2 Defining Vulnerability, Adaptation And Coping ……...……16

2.2.1 The concept of vulnerability……..16

2.2.2 Coping and adaptation…….21

2.3 Climate Variability ……...24

2.3.1 Climate variability over Southern Africa ……...……..26

2.3.2 Botswana climate ……..…28

2.4 Vulnerability To Climate Variability ……..37

2.4.1 Poverty……..39

2.4.2 Unemployment……..41

2.4.3 Health……....42

2.4.4 Political constraints……..45

2.4.5 Cultural constraints……...……47

2.5 Coping With Climate Variability……...……...47

2.5.1 Indigenous coping strategies……...…..48

2.5.2 More recent strategies……...…51

CHAPTER THREE

METHODOLOGIES ……..……...…59

3.1 Introduction …….……..……59

3.2 Research Framework .……..……59

3.3 Secondary Data ……..……....…63

3.4 Preparation Before Fieldwork ….……63

3.5 Primary Data ……..……....…64

3.5.1 Questionnaire……....64

3.5.2 Participatory Rural Appraisal……..66

3.5.3 Observation……...……69

3.5.4 Face-to-Face Interviews……..…….69

3.6 Data Analysis ……..……69

CHAPTER FOUR

PHYSICAL AND HUMAN ENVIRONMENTAL SETTING OF MATSHENG AND KASANE ……..……71

4.1 Introduction…….……..…….71

4.2 Physical Environmental Setting ….…….....71

4.2.1 Location……..…..71

4.2.2 Climate……..72

4.2.3 Soil conditions……...…77

4.2.4 Vegetation…….78

4.2.5 Change in Vegetation…….....82

4.3 Human Environmental Setting…….83

4.3.1 Socio-economic characteristics of household respondents and focus groups……...…….84

CHAPTER FIVE

EFFECTS OF CLIMATE VARIABILITY ON RURAL SOCIETIES IN MATSHENG AND KASANE …….……..94

5.1 Introduction …….....94

5.2 Effects of Climate Variability……..……....94

CHAPTER SIX

PAST AND CURRENT COPING STRATEGIES IN KASANE AND MATSHENG……..103

6.1 Introduction….……103

6.2 Past Coping and Adaptation Strategies in Kasane and Matsheng……..103

6.3 Current Coping and Adaptation Strategies in Kasane and Matsheng ……..…107

6.3.1 Formal Employment…….....110

6.3.2 Labour for cash or in-kind……..112

6.3.3 Reduced number of meals eaten per day……115

6.3.4 Sale and ownership of livestock……..115

6.3.5 Informal activities……...119

6.3.6 Government intervention……121

6.3.7 Prostitution…….125

CHAPTER SEVEN

CONSTRAINTS AFFECTING COPING AND ADAPTATION TO CLIMATE VARIABILITY IN KASANE AND MATSHENG …..…….127

7.1 Introduction…….……..……...127

7.2 Dependency On Government…….……...……..128

7.3 Poverty…….……..……...130

7.4 Unemployment…….……...…….……...….133

7.5 Health…….…….……...…134

7.6 Physical Environment…….……...……...……...138

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS …….....140

8.1 Introductiion…….……....140

8.2 History of Climate Variability in the Southwestern and Northern Parts of Botswana (30 Years)…….…….141

8.3 The Impact Climate Variability has Had on Rural Societies Living in Matsheng and Kasane……...……...…142

8.4 Coping and Adapting Strategies……..……..……..……142

8.5 Factors Heightening or Weakening Ability to Cope and Adapt to Climate Variability……...146

8.6 Recommendations ……...……...…148

REFERENCES ……...…150

APPENDIX 1 …….176

APPENDIX 2 ……..……184

APPENDIX 3……..186

LIST OF FIGURES **PAGE**

Figure 1.1: Location of Matsheng and Kasane 9

Figure 1.2: Botswana's location in Southern Africa 11

Figure 2.1: Casual structure of vulnerability 18

Figure 2.2: Circulation patterns over Southern Africa 27

Figure 2.3: Average annual rainfall of Botswana 31

Figure 3.1: Research framework 62

Figure 4.1: Annual rainfall (mm) for Kasane 71

Figure 4.2: Annual rainfall (mm) for Matsheng 76

Figure 4.3: Main type of soil in Matsheng 77

Figure 4.4: Main type of soil in Kasane 78

Figure 4.5 and 4.6: Vegetation in Kasane 79

Figure 4.7 and 4.8: Vegetation in Matsheng 80

Figure 4.9: Saltpan 81

Figure 4.10: Livestock water point 81

Figure 4.11: Dinning room 83

Figure 4.12: Household size in Matsheng 87

Figure 4.13: Household size in Kasane 87

Figure 4.14: Respondents level of education in Matsheng 88

Figure 4.15: Respondents level of education in Kasane 88

Figure 4.16: Respondents occupation in Matsheng 90

Figure 4.17: Respondents occupation in Kasane 90

Figure 5.1: Healthy cattle 100

Figure 5.2: Unhealthy cattle 100

Figure 5.3: Impact of drought 101

Figure 6.1: Percentage of households in different employment sectors in Matsheng 111

Figure 6.2: Percentage of households in different employment sectors in Kasane 112

Figure 6.3: Chobe River 113

Figure 6.4: Ownership of cattle in Matsheng 116

Figure 6.5: Ownership of cattle in Kasane 116

Figure 6.6: Ownership of goats in Matsheng 117
Figure 6.7: Ownership of goats in Kasane 117
Figure 6.8: Women selling fish in Kasane 120
Figure 9.9: Dry fish sold by Botswana women 120

LIST OF TABLES

Table 4.1: Monthly rainfall (mm) for Kasane 73
Table 4.2: Monthly rainfall (mm) for Matsheng 75
Table 4.3: Reasons for decline in vegetation 82
Table 4.4: Age and sex of respondents in Kasane 85
Table 4.5: Age and sex of respondents in Matsheng 85
Table 4.6: Wealth ranking of households in Kasane and Matsheng 91
Table 5.1: Respondent's responses concerning effects of climate variability 108
Table 6.1: Current coping strategies reported in Matsheng and Kasane 105

LIST OF ACRONYMS

AGU	American Geophysical Union
AIACC	Assessment of Impacts and Adaptation to Climate Change
AIDS	Acquired Immune Deficiency Syndrome
BIDPA	Botswana Institute of Development and Policy Analysis
DFID	Department for International Development
ECA	Economic Commission for Africa
FAO	Food and Agriculture Organization
G8	The Great Eight Countries
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
IGBP	International Geosphere-Biosphere Programme
IHDP	International Human Dimensions Programme
IISD	International Institute for Sustainable Development
ITCZ	Inter-Tropical Convergence Zone
IPCC	Intergovernmental Panel on Climate Change
NDMC	National Drought Mitigation Centre
NRC	National Research Council
RADS	Remote Area Dwellers
RVAC	Regional Vulnerability Assessment Committee
SADC	Southern African Development Community
SADCC	Southern African Development Coordination Conference
SAVI	Southern Africa Vulnerability Initiative
SEI	Stockholm Environmental Institute
START	a global change SysTem for Analysis, Research and Training of the International Human Dimensions of Global Environmental Change

	Programme (IHDP), the International Geosphere-Biosphere Programme (IGBP) and the World Climate Research Programme (WCRP)
TB	Tuberculosis
UCS	Union of Concerned Scientists
UK	United Kingdom
UN	United Nations
UNAIDS	United Nations programme on HIV/AIDS
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
US	United States
WFP	World Food Programme
WMO	World Metrological Organization
WWF	World Wildlife Fund