INVESTIGATION OF THE EFFECTS OF 2000 & 2007 FLOODING ON FOOD SECURITY IN TWO EAST AFRICAN COUNTRIES

By

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ABSTRACT

Flooding has been identified as the predominant, environmental generator of food emergencies. Climate change and climate variability have been blamed for these extreme weather events, which are envisioned to affect the future food security and nutritional status of populations across the African continent. It is thus expected that these weather phenomena will continue to increase in frequency and intensity as climate change progresses. Already, climate change has had a dramatic effect on the natural world with increased desertification, warming oceans, rising temperatures and changing weather patterns. In turn, this has affected agriculture and fishing, which subsequently determines the availability of food. On the contrary, weather alone, is not the sole contributing factor to problems that are associated with food security/insecurity. Elements embedded within a political, social, economical, and/or other, context also serve to contribute to how a population or individual experiences food security. It is therefore imperative that these aspects from the social or developmental arena are considered in conjunction with aspects from the natural or environmental sciences. Such a holistic approach to subjects relating to climate change and development will eventually lead to the realisation of sustainable development, which in turn serves to protect human security in the long-term.

The research was primarily directed at examining how flooding affects food security and what can be done to avoid, or cope with, a potential food crisis. The above-mentioned social and developmental features shaped the scope of this research, giving rise to an investigation which transcended the confines of flooding as an independent cause and consequence of food insecurity. With East Africa as a focal point, Mozambique and Zambia emerged as the most affected countries with millions of people affected by these devastating waters in 2000 and 2007, respectively. Due to the past nature of the events, it was most appropriate to utilise statistics from sources such as existing databases, reports and articles. Some of the topics that were included in the investigation examined the causes and consequences of the flooding and the management of these disasters. These topics were scrutinised using both qualitative and quantitative dimensions of research, so that an interesting and viable study could be undertaken.
The research found that frequent and severe flood disasters increase a population’s vulnerability to food insecurity, as a wide variety of assets, structures and infrastructures are destroyed. However, with careful management, planning and adaptation, many of these unwanted consequences can be avoided or swiftly overcome. Both Mozambique and Zambia were found to be countries that were determined to overcome the barriers associated with climate change and its subsequent extreme weather events. This positively indicated that they were committed to the development process and the wellbeing of their populations.

Apart from introducing the topic surrounding the influence of flooding on food security in East Africa, one of the main goals of this research was to gather recommendations and suggestions for avoiding or managing issues that could hamper food security. This ultimately forms an important source of reference for governmental and non-governmental institutions dealing with flooding and food security. Even though Mozambique and Zambia were chosen as the cases for investigation, many of the recommendations can be adapted and applied to countries world-wide.
ACKNOWLEDGEMENTS

This thesis has been inspired by, and is dedicated to, the people of Africa who face an ongoing battle against hunger and starvation.

I would like to express my heartfelt gratitude to Ms. Bernadette Snow, under whose supervision I have completed this thesis. Ms. Snow has provided support, encouragement and professional guidance that have extended beyond all expectations. I would also like to thank Prof. Richard Haines, who has provided assistance and encouragement when it was most needed and who has provided very pertinent input and feedback for the completion of this dissertation. I am also grateful to Dr. Leonie Steyn, from the University of South Africa. Dr. Steyn has provided support and has played a role in fuelling my interest in nutrition and food security.

Finally, I would like to thank my family and friends, especially my husband Arne Ragnar, for providing a listening ear and the motivation to bring this thesis to fruition. Arne Ragnar, your devotion and understanding has been the foundation of my success. Thank you.
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LIST OF ACRONYMS AND ABBREVIATIONS

AIDS Acquired Immuno-Deficiency Syndrome
ADPC Asian Disaster Preparedness Center
AfDB African Development Bank
ALNAP Active Learning Network for Accountability and Performance in Humanitarian Action
ANC African National Congress
APFM Associated Programme on Flood Management
AU African Union
BBC British Broadcasting Corporation
CAP Consolidated Appeals Process
<table>
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<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>CBPP</td>
<td>Contagious Bovine Pleuropneumonia</td>
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<td>CO₂</td>
<td>Carbon Dioxide</td>
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<td>DEC</td>
<td>Disasters Emergency Committee</td>
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<td>DFID</td>
<td>Department for International Development</td>
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<td>DMMU</td>
<td>Disaster Management and Mitigation Unit</td>
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<tr>
<td>ECJRC</td>
<td>European Commission Joint Research Centre</td>
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<tr>
<td>EHA</td>
<td>Emergency and Humanitarian Action</td>
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<td>EM-DAT</td>
<td>Emergency Events Database</td>
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<tr>
<td>ENSO</td>
<td>El-Niño – Southern Oscillation</td>
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<td>FANRS</td>
<td>Food, Agricultural and Natural Resources Statistics</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>FRELIMO</td>
<td>Liberation Front of Mozambique</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>HA</td>
<td>Hectares</td>
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<td>HDI</td>
<td>Human Development Index</td>
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<td>HIV</td>
<td>Human Immuno-Deficiency Virus</td>
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<td>IASC</td>
<td>Inter-Agency Standing Committee</td>
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<td>IFM</td>
<td>Integrated Flood Management</td>
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<td>IFRC</td>
<td>International Federation of Red Cross and Red Crescent Societies</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<tr>
<td>INAM</td>
<td>National Meteorological Institute of Mozambique</td>
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<td>INGC</td>
<td>National Institute of Disaster Management</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>IRIN</td>
<td>Integrated Regional Information Networks</td>
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<tr>
<td>ITCZ</td>
<td>Inter-Tropical Convergence Zone</td>
</tr>
<tr>
<td>MSF</td>
<td>Médecins Sans Frontières</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>MMD</td>
<td>Movement for Multiparty Democracy</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
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<tr>
<td>NORAD</td>
<td>Norwegian Agency for Development Cooperation</td>
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<tr>
<td>OCHA</td>
<td>Office for the Coordination of Humanitarian Affairs</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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OSOCC  On-Site Operations Coordination Centre
RENAMO  Resistencia Nacional Moçambicana
SADC  Southern African Development Community
SANDF  South African National Defence Force
SETSAN  Technical Secretariat for Food Security and Nutrition
SOI  Southern Oscillation Index
SST  Sea Surface Temperature
UN  United Nations
UNDP  United Nations Development Programme
UNESCO  United Nations Educational, Scientific and Cultural Organization
UNFCCC  United Nations Framework Convention on Climate Change
UNFPA  United Nations Population Fund
UNICEF  United Nations Children’s Fund
UNGIWG  United Nations Geographic Information Working Group
UNISDR  United Nations International Strategy for Disaster Reduction
USAID  United States Agency for International Development
US$  United States Dollar
VAC  Vulnerability Assessment Committee
WEDO  Women’s Environment and Development Organization
WFP  World Food Programme
WHO  World Health Organization
WMO  World Meteorological Organization
WTO  World Trade Organization
ZVAC  Zambia Vulnerability Assessment Committee
CHAPTER 1: INTRODUCTION

The subject of climate change has emerged as a prominent topic over recent years. Researchers investigating the causes and effects of global warming and its associated climate change, such as those working on the Intergovernmental Panel on Climate Change (IPCC), have described a very bleak future scenario for planet earth. According to scientists, the impacts of our changing weather will only continue to worsen unless strategies are employed to halt or reverse the CO₂ emissions responsible for the global warming that is currently taking place (United Nations Development Programme (UNDP, 2007:107).

However, it is not simply the changing weather and climate patterns that are of concern. The most serious considerations are how the changing climate impacts human (as well as plant and animal) life and how we will be able to cope with it in order to preserve our current resources for future generations. For example, it has been predicted that agricultural production, fishing, as well as access to food, will be jeopardised by climate change in Africa (IPCC, quoted in Riché, 2007). Brown (2004) stated that a mere 1 °C rise in temperature would result in a 10% decrease in rice, corn and wheat yields. This in turn means that it would result in a 10% decrease in the amount of grains available for consumption, resulting in higher food prices and/or a larger number of hungry people.

Furthermore, according to Brown (2004:10), 1000 tons of water is needed to produce 1 ton of grain and therefore food security is very much dependent on water security. The decreasing water tables, resulting from rising temperatures, therefore pose many problems in an era where the demand for increased food production requires water and irrigation (Brown, 2004:9 & 10). However, climate change is also feared to have consequences that extend beyond agriculture and food security. For example, the UNDP (2007:92) raises the concern of emerging conflict as a result of climate change in certain countries, while Murphy (2006:6) is troubled that people in African areas with low agricultural productivity will have their dependency on ecosystem diversity for natural medicine sources, food and other natural materials, threatened. Brown’s (2004:194) prediction that “food security could quickly eclipse terrorism as the overriding concern of governments” indicates the seriousness of the current situation.
Maybe even more troublesome though, is the UNDP’s (2007:85) opinion that if climate predictions are correct, a swift reversal in human development will occur in countries affected by climate disasters such as droughts and floods. This is especially true of poorer countries, where the population has a higher risk of being caught in poverty traps that would decrease their possibility of gaining access to medical, educational and other basic resources. The UNDP (2007:89) does, however, acknowledge that not every extreme weather event will result in decreased human development or an increase in vulnerability. Here, they recognise that governments, institutions and/or policies, can be highly influential in the outcome of such disasters.

This ‘development’ to which the UNDP (2007) refers, is a term that has been evolving over a very long period of time. The reason for this evolution is most likely due to the fact that it was recognised that the conditions of the majority of the population in the developing world had not improved (Webster 1990:32). Poverty and its associated difficulties are still abundant today, people continue to suffer, and ‘development’ seems to have eluded many in the poorer South. According to Hawi (2005:2 & 3) the term development has gradually progressed in the following way, as illustrated in figure 1.

**Figure 1.** Evolution of the concept of development.

Source: Adapted from Hawi, 2005:2 & 3.
Moving from a definition that was fundamentally founded on economic growth and measured in terms of Gross National Product (GNP), it was recognised that it was not enough to define development in terms of monetary values (Webster, 1990:26-34). As a result, human development as we know it today, takes into account the conditions of the whole individual. The social, cultural, political and economic factors that shape and influence the wellbeing of an individual have therefore gained prominence (Hawi, 2005:3). Indeed an improvement has been made in terms of the approaches used to address this complex subject, but still it has not produced significant results. Large numbers of people continue to live in abject poverty, struggling to meet their basic needs (of which the need for food features prominently) (Gough & McGregor, 2007). Hence, in search for the ultimate formula or answer to the question of underdevelopment, scholars, academics and policymakers continue to work tirelessly towards developing the ideal solution that will eradicate poverty and catapult the poorer South into development and prosperity. Sustainable development and the idea of linking relief with development are two such progressions that have been evolving over many years as well. These concepts are gaining popularity, as governments and non-governmental organisations (NGOs) desperately clutch at possible ways and means to assist the needy. These two ideas will be explored at greater depth in the literature review, in chapter 2.

The fact that scholars and experts are constantly searching for ways to improve on the approaches to development is indeed very positive. However, as Tickle (2003) points out,

“The challenge facing academics, subject specialists, country experts and non-governmental organisations (NGOs) is how to find creative ways for their findings to influence public policy debate so that valuable knowledge can make the leap from theory into the kind of practical application that changes lives”.

This is exceptionally important, because theory and research means absolutely nothing if it is not serviceable to those for whom it matters most. Putzel, quoted in Tickle (2003), has experienced that many people are not interested in reading lengthy written works. Rather, he has found that working together in a face-to-face situation is much more productive. Similarly, Greene (cited in Tickle, 2003), also recommends that researchers need to be more engaged in a dialogue with
policymakers. Hence, perhaps one of the greatest challenges in the field of development is to actually turn theory into practice, making it more understood and accessible to the target populations.

Such an approach is especially crucial with regard to the challenges brought about by climate change, as discussed earlier. It therefore becomes critical that the scientific community (i.e. those addressing climate change), and the development community (i.e. those involved in the various divisions within the field of development, whether governmental or non-governmental, policy or programme sectors) engage in meaningful dialogue that can be translated into pro-active strategies that will benefit the people and countries of the developing world.

1.1. The research question

Inspired by the humanistic approach, the formulated research question is: ‘How does the severity and/or frequency of flooding affect a country’s ability to deal with its population’s food security?’

Informed by this research question, the following sub-problems that were addressed include:

- the causes of the 2000 and 2007 flooding in East Africa;
- how the population was affected;
- how flooding impacted food security;
- what actions can be taken to improve food security;
- what lessons were learnt from previous flooding and
- what strategies or policies can be used to cope with future flooding.

1.2. Purpose of the investigation

This study was aimed at describing and comparing the effects of the 2000 and 2007 East African flooding on the Mozambican and Zambian populations’ food security. In essence, the purpose of this study was to investigate how the population, government, institutions, agricultural, and other sectors in Mozambique and Zambia
experienced these flooding events in relation to food security. An attempt was made to understand this relationship through the provision of verbal and numerical information, examination of the causes (e.g. change in rainfall patterns) and consequences (e.g. impact on built structures) of the flooding and comparing how these disasters were experienced by these two countries.

By comparing the role that the 2000 and 2007 flooding played on food security in Mozambique and Zambia, a deeper understanding of each country’s successes and failures in dealing with this issue could be attained. The study also sought to gain an insight into the strategies or policies that can be implemented to help a country prevent a food shortage and secure or improve its’ population’s access to food, during an incidence of flooding. However, the literature review importantly reveals that food security does not solely depend on weather, climate or other natural phenomena. Food security is actually closely governed by conditions that have a social, economic and/or political basis. Hence, in order to contribute to the developmental body of knowledge, this study needed to explore these factors as well.

1.3. Significance of the study

According to authors like Yamin (2004:1), studies into the relationship between climate change and development have only recently emerged. This particular investigation into flooding and food security revealed that there is a lack of information and knowledge surrounding this topic. A large body of literature exists on flooding and food security as separate subjects. However, a literature search specifically directed at sourcing information about the effects of flooding on food security yielded few results. Not many concrete articles about this subject, was forthcoming. Much of what was found relates directly to flooding and agriculture, animal husbandry or health, but the subject of flooding and food security (in its totality, that is, as a social phenomena) appears to be lacking.

Clay, Bohn and de Armas (2002) found that drought received much attention in climate forecasting and early warning activities, while precipitation and flooding were often overlooked. This perhaps explains the gap in the literature as drought appears
to be a weather phenomenon that receives more consideration, in comparison to flooding. It was also found that many studies examining the relationship between health issues and flooding exist. This research project has therefore played a significant role in exploring and adding to the knowledge base of East African flooding effects on food security, and it has highlighted the important strategies or policies that can be utilised by governments and other actors in the process of securing food access.

Apart from adding to literature dealing with flooding and food security, the research will also make a contribution to the field of human security. Where the narrow approach to human security focuses almost explicitly on violence (e.g. armed conflict), the broader approach promotes the inclusion of hunger and starvation, natural disasters, and disease. Advocates of the broader view of human security hold that less people are killed in the sum total of war, terrorism and genocide, than those who lose their lives to hunger, natural disasters and disease (Human Security Centre, 2005:viii). This claim then highlights the extreme importance of understanding a natural disaster, like flooding, and its influence on food security. The multi-disciplinary and multi-dimensional nature of the study, could also allow it to contribute to the field of sustainable development. This approach is essentially multi-faceted and joins experts and specialists from an array of fields (including, but not limited to, environmental, social, political and economic areas) (Estes, 1993), hence this research could be particularly useful here.

In addition, the significance of understanding flooding and its effects on food security can be seen in Rukandema and Gürkan’s (2005) identification of flooding as the main, natural cause of food emergencies. This sums up the relevance of understanding these extreme weather events, as countries will evidently be faced with these extremities and the food security challenges that will arise from them, on an all too regular basis. The occurrence of extreme weather events (namely flooding in this case) means that governments, agencies and communities will require knowledge and strategies that will assist them in coping with this disaster type and its consequent effects. In order to plan and design policies and programmes, these institutions would need to consult literature, such as this dissertation, to learn about
the experiences of other countries, to determine which actions and strategies failed and which succeeded, as well as to identify recommendations.

1.4. Assumptions

Neuman (1997:41) states that “One way for a researcher to deepen his or her understanding of a concept is to identify the assumptions on which it is based”. Besides enhancing understanding, assumptions were also found to assist with the construction of concepts and theories. Considering its importance, the following six assumptions have arisen from the research.

i. The El-Niño – Southern Oscillation (ENSO) weather phenomenon will continue to produce extreme weather events that will affect Mozambique and Zambia, both directly and indirectly.

ii. The severity and frequency of these weather events (in this case, flooding), as well as the country’s coping and adaptation mechanisms, influences the countries’ level of food security and development.

iii. Without the proper management of food (and other) aid, a population will become dependent on the State to meet their basic needs. Therefore, strategies that encourage their swift recovery from a disaster are imperative.

iv. Proper information and/or knowledge management and sharing, will assist in reducing the negative effects that arise from flooding.

v. Mozambique and Zambia can increase their food production, and hence their food security, as they possess environmental resources (e.g. dams for fishing and land for grazing).

vi. The Mozambican and Zambian governments and populations will succeed in reducing the impact of future flooding events because they are committed to the process of adaptation to climate change and development.

Contrary to the ‘Afro-pessimism’ view that proposes that there is not much left of Africa’s history, culture or social tradition that can be utilised as a foundation for the defeat of underdevelopment (Andreasson, 2007), the last to assumptions provide a positive outlook for the future of these countries. This creates a beacon of hope that could serve to inspire and motivate the development community. All is certainly not lost because both Mozambique and Zambia possess tremendous natural resources,
and people who are motivated to bring about change for the better. All six assumptions are probably best suited to the field of sustainable development. As Banuri and Opschoor (2007:17) state, "Linkage of climate to development policies will ‘make development more sustainable’". Sustainable development adds variety and responsiveness to the change that is required in order to alter adaptive capacity, and encourage mitigation attempts. Most importantly though, sustainable development offers developing countries refreshed hope for liberation, self-reliance and progression (Estes, 1993:16). People become motivated to embrace creativity and continue with their efforts when hope abounds, thereby bringing them even closer to realising their goals.

1.5. Chapter overview

As discussed earlier, the threatening circumstances arising from the current and future climatic conditions calls for the attention of governments, scientists and other actors and institutions. Serious thought is absolutely necessary to avoid a future global crisis pertaining to a country’s, and a population’s, ability to feed itself. With Africa having endured at least two major flooding events in recent years, it emerged as relevant and appropriate to investigate and compare the events and their consequent impacts.

The scope of the research has extended over a wide range of subject matter. In order to present the reader with an approachable document that is fundamentally easy to read, it was most imperative to divide the material into chapters with appropriate sub-headings. The following presentation of the various chapters provides a brief outline of the topics under discussion, as well as the order of the dissertation.

Chapter 2 principally deals with the literature review. Here, the various theories and viewpoints that have formed the backbone of the research are investigated. Issues relating to human needs, risk and development are explored in a fairly compact manner. These subjects, as stand-alone topics, contain an immense amount of material that could not be examined in its’ totality, in this research. So, in part, the theoretical framework presented in the literature review paves the way for further reading. An in-depth inquiry into the relationship between climate change, flooding
and human and food security was also required. The understanding and knowledge acquired from the examination of relevant literature set the backdrop for the study and placed many viewpoints and ideas into perspective. Importantly, it emerged from the literature review that food security is not only impacted by the changing climate and extreme weather events like flooding. Instead, the social, political and economic constituents of a society play an equally important role in a population's experience of food security. These factors were thus included in the research, as a necessary component for the understanding of food security in Mozambique and Zambia. Furthermore, the concept of sustainable development and the idea of linking relief with development also required attention, as these two subject areas are also imperative in development studies. However, in order for the research to be executed properly, it needed to adhere to the principles and practices of good research.

Hence, the research objectives and methodology that are presented in chapter 3 were central to the successful execution of the research. The research objectives, which outlined the aims and goals of the research, were established and discussed, while the research methodology set the scene for the accomplishment of these goals. Using Neuman (1997) as a reference, each step in the research process (e.g. sampling techniques, data collection and analysis, as well as reliability and validity issues) were determined and discussed. Once the population was selected according to the sampling procedure, it was applicable to become more familiar with the countries in question. Chapter 4 therefore emerged as a section that examined the country profiles of Mozambique and Zambia. A brief analysis of the countries' demography, political history and food production abilities and activities was undertaken. To a large degree this was required in order to gain an understanding of the conditions and circumstances that would affect the countries' capacity to deal with flood disasters and food security, as well as to identify and understand the countries' constraints and/or openness to development.

Continuously referring to the research objectives, the results of the investigation were documented in Chapter 5. Firstly, it was necessary to determine the causes and consequences of the 2000 and 2007 flooding in Mozambique and Zambia. This included an examination of non-climatic factors such as, buildings and infrastructure, logistics and transport, health and disease, agriculture and fishing, water and
sanitation, displacement and resettlement. The local and international institutions’ management and intervention throughout the catastrophe was just as relevant, and was therefore described as well. A mere documentation of ‘how’, ‘when’, ‘who’, ‘why’ and ‘what’ had occurred, was simply not enough. These results had to be discussed and analysed in order to make some meaningful contributions to academic literature. Therefore, chapter 6 arose as a pertinent discussion of the results. The relationship between the impacts of flooding (in various systems) and its consequent effects on food security was determined and analysed. Besides establishing how the damage to tangible and intangible resources can, or had, impacted food security, it was most valuable to establish the influence of national and international management and intervention during the crises.

Having reached an understanding of the situation, the arising recommendations could then be suggested. Chapter 7 therefore deals with the recommendations, as well as the concept of adaptation. As an idea, adaptation is growing in popularity amongst those concerned with climate change and human security and development. It also offers some very valid considerations for addressing the challenges associated with climate change and the extreme weather that it produces. The recommendations included an overview of:

- preparedness and risk reduction;
- information and early warning;
- evaluation and assessment;
- the role of aid agencies during disasters;
- the role of local involvement during disasters;
- basic needs requiring attention;
- coping strategies used by the population;
- coping strategies used in the agricultural sector and
- strategies to protect/promote household food security.

A generic flood disaster and food security management plan was included as a guideline for countries that are faced with flooding and the resulting food insecurity. This plan can be utilised by governments and other agencies or institutions that are interested in addressing food security issues that arise from flooding. Included in
chapter 7, was a very brief examination of Mozambique and Zambia’s responses to
the topic of climate change adaptation. This discussion provides a quick look into the
policies, practices, conventions, and other plans and strategies, which the countries
in question have adhered to, or applied. In chapter 8, the entire document is
summarised and the final conclusions are drawn. Furthermore, the nature of the
contribution is provided together with some recommendations for future research.

1.6. Concluding section

Climate change is a process that has already begun. The effects thereof are
predicted to have many detrimental effects in the years to come (Godrej, 2006).
Hydrometeorological disasters especially, are ravaging both the developed and
developing world. For those in the more developed West, who have insurance
policies, savings or investments in banks and other financial institutions, the impact of
a flood hazard may very well be an extremely unpleasant experience, but they would
be able to recover their near former state of existence and livelihood fairly rapidly.
What happens to those in the developing world though, who do not have access to
such resources or backup? Those who are living on less than US$ 1 a day, like 90%
of Mozambique’s population (Slaughter, 2000) – how do they cope with and recover
from a disaster that destroys their belongings, and in some cases their entire
livelihood?

The documentary included with the footage of the 1985 Live Aid concert provides an
account of one of the worst famines that modern history has seen. Nearly three
decades later, very little seems to have changed. There has been an unending
number of meetings, agreements, programmes, policies, conventions and the like,
but in the end, millions of people are still dying from starvation on a daily basis. This
has basically been the underlying motivation for embarking on the research; to find
out what can be done to stop the food insecurity and subsequent starvation of
millions of innocent people. Hawi (2005:3) too recognises that centuries have been
the witness to many failed attempts of development in Africa. Adopting and utilising
the western theories and methods of development appear to have been fruitless and
even counter-productive in some instances. Therefore, Hawi (2005:6) suggests that
Africans should develop their own models for development, based upon the
traditions, beliefs, values and norms, which play an all-important role in African culture and society.

Indeed, if orthodox western models of development have been producing marginal results, or completely failing in other instances, then perhaps it is time for a new approach. Of course, Africa should not utterly abandon the lessons and body of knowledge from the West. Instead, Africa should grasp and nurture those aspects that are relevant, while working in partnership with the developed world (Hawi, 2005:9). As mentioned earlier, the scientific and development communities should unite in a dialogue that works towards the benefit of all, but this concept of harmony and inclusion should not stop here. Rather, the process of development should be transformed to include collaborative efforts between the developed and developing countries, the government and NGOs, experts and the locals.

In a similar manner, this investigation into the effects of flooding on food security in Mozambique and Zambia in 2000 and 2007 may be of interest to social movements, community action groups, political organisations, aid agencies or other scholars interested in human and food security, climate change, flooding or development. This research is not geared towards informing one specific audience, but rather covers a broad spectrum of the development community. Furthermore, this topic is so wide, and so intricate, that it appears as if only a small portion has been examined in this research. Hence, there is much potential to continue with this research as part of a doctoral study. Alternatively, it is possible to explore one of the concepts or subjects that have been investigated, as part of any other level of research. The following chapter covering the literature review will provide an added insight into subject matter that might be interesting for future research.
CHAPTER 2: LITERATURE REVIEW

The literature review’s main purpose was to determine the relationship between climate change and extreme weather events (particularly flooding), and how it relates to food security. This matter has subsequently arisen as a multi-dimensional subject that contains socio-economic, political, as well as other aspects related to development.

Authors, such as de Wit (2006) and the UNDP (2007:75), have found that the incidence and frequency of extreme weather events like floods, droughts and raised temperatures have increased world-wide. Others though, like Alexander (2001), hold that “Disasters are not increasing because of the increase in the frequency of hazards, but due to the increasing vulnerability to hazards”. Vordzorgbe (2007:4) identifies the following as factors that influence a population’s vulnerability to hazards, namely:

- weak governance;
- armed conflict;
- poverty;
- development burdens (e.g. unplanned urbanisation, population growth, inadequate economic growth);
- environmental degradation and
- disease (e.g. HIV/AIDS).

It is therefore not entirely unexpected that the term ‘risk’ is likely to become one of the dominant concept of the early 21st century, in the same manner as ‘globalisation’ featured as the prevailing idea in the 1990s (Quiggin, 2007:3). In various ways, unpredictability and risk have grown to become prominent traits of life in the present age. The adequacy or inadequacy of a society in counteracting risks which contain social elements, like natural disasters and environmental degradation, can be used to judge the ability and responsiveness of a government. Responses to the ‘risk society’ can be recognised in assorted actions, like public disaster relief operations and various protection laws and policies (Quiggin, 2007:8), all of which echo the need for security on every level of society.
This review has been fuelled by such opinions, provoking further investigation and debate around factors that were not related to climate, but which also influence a population’s food security status. Likewise, it became necessary to broaden the understanding of these factors so that the descriptive questions relating to ‘who’, ‘what’ and ‘how’ could be addressed in the research. Although it was not possible to review all the consulted literature in this report, a conscious effort was made to incorporate the most pertinent topics and arguments that have emerged from the readings. As a result, the subjects of theory, climate change, flooding, human security, food security, risk and development arose as important topics in the discussion.

2.1. Theoretical framework

Development Studies is an inter- and multi-disciplinary field that serves to investigate issues that are relevant to the developing world. Development theories vary according to:

- when and where they were composed,
- the political stance of their proponents,
- the basis of their ideologies, as well as
- their scientific origin (i.e. whether it was governed by economics, sociology, anthropology, geography or history) (Peet & Hartwick, 1999:3).

It is thus important to note that even though a wide variety of approaches could have been utilised as a background to the research, the principles and theories which predominantly adhere to a humanistic approach have been adopted.

The hierarchy of needs, developed by the 20th century humanistic psychologist Abraham Maslow, was the first influential theory that shaped the underlying thoughts and ideas of this research. According to Maslow (cited in Meyer, Moore & Viljoen, 1997:439), an individual’s development moves through a series of requirements before self-fulfilment is attained.
Hence, an individual’s basic needs (as illustrated in figure 2) have to be met before he/she can develop optimally and reach a state of self-actualisation. However, Maslow does recognise that needs are not always prioritised in strict accordance with the hierarchy. People may shuffle these needs about, depending on what they deem to be the most urgent at a specific time (Meyer, et al. 1997:439). Nonetheless, the physiological needs (of which the need for food forms a part) lies at the bottom of the scale and essentially deals with a person’s survival. If these physiological requirements are not met, they will continue to overshadow all the other needs. As it relates to this research, one can therefore assume that a hungry person may not be interested in, or have the ability to, undertake the other higher ranking needs such as work, education, taking care of others or achieving additional goals. In turn, such an occurrence has crucial implications for the subject of development as a whole. Without individuals who are able, or motivated, to improve and enhance themselves or their societies, the entire process of development can be hampered. The same process would occur if, for example, individuals place their safety needs (that is, protection from drowning or injury during flooding) as the most important needs. Preoccupied with their protection from physical harm, they would not be particularly

Figure 2. Maslow’s hierarchy of needs.
interested in partaking in other activities necessary for personal and social development.

Psychology though, is not the only field that refers to human needs. According to Gough and McGregor (2007:9), “The concept of human needs has long been a cornerstone of developmental thinking”. Here, they too refer to a “… core set of basic needs” that has to be met in order for development to occur (Gough & McGregor, 2007:9). According to them, this notion was propelled in the mid- to late-1970’s when it was recognised that the Gross Domestic Product (GDP) and economic growth, were deficient means with which to measure human welfare and development.

The basic needs approach did not escape criticism though. For example:

a) the state’s ability to delineate what people needed was challenged,

b) critics from developing countries expressed uncertainty, as they considered this approach to be post-imperial condescension and cultural colonialism, while others viewed it as

c) a way of undermining their appeals for a “New International Economic Order” (Gough & McGregor, 2007: 9).

In 1995, nearly 20 years later, the UN Summit on Social Development subscribed to a collection of goals for addressing world poverty over the next two decades. Subsequently, the Millennium Declaration was adopted in 2000 by the UN’s General Assembly. The identified Millennium Development Goals (MDGs) outline aims and indicators for a variety of basic needs (e.g. hunger, health and education, to name a few) (Gough & McGregor, 2007:10). This approach’s new found vigour has been attributed to the clearly visible signs of ongoing, extreme poverty that is affecting millions of people across the globe.
Gough and McGregor (2007:10) hold that sub-Saharan African countries especially, have displayed a moderate amount of growth, which is all too often, yoked with escalating poverty. It is therefore amidst such evidence that the idea of opposing the basic needs approach begins to lack value and can even be regarded as being unproductive (Gough & McGregor, 2007:10). They also attribute the resurging interest in human basic needs to new conceptual thinking. The work of Amartya Sen, the 1998 Noble Laureate in economic sciences, has been quite influential here. Sen’s work has been described by Bagchi (1999) as the “human science of development”. According to Bagchi (1999), Sen has examined the ideals that support the customary arguments of economics and have exhibited them as being partly deficient. He also expanded upon the range of questions of other social and political theorists and social scientists.

Interestingly, Sen (1999:11) is of the opinion that people need not be viewed merely as inactive beneficiaries of insidious development projects. On the other hand, he is of the opinion that individuals can efficiently mould their own futures, and assist each other in this process, when they have access to sufficient and favourable social circumstances (Sen, 1999:11). This viewpoint is extremely relevant when one considers the need to reduce a population’s reliance on aid and encourage independence instead.

Figure 3. The Millennium Development Goals.

<table>
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<tr>
<th>Millennium Development Goals</th>
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<tr>
<td>Eradicate extreme poverty and hunger</td>
</tr>
<tr>
<td>Achieve universal primary education</td>
</tr>
<tr>
<td>Promote gender equality and empower women</td>
</tr>
<tr>
<td>Reduce child mortality</td>
</tr>
<tr>
<td>Improve maternal health</td>
</tr>
<tr>
<td>Combat HIV/AIDS, malaria and other diseases</td>
</tr>
<tr>
<td>Ensure environmental sustainability</td>
</tr>
<tr>
<td>Develop a global partnership for development</td>
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</table>

Source: UN Statistics Division, 2008.
Sen (1999:3) suggests that “... the removal of major sources of unfreedom: poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation, neglect of public facilities as well as intolerance or overactivity of repressive states” is required in order to promote development. He further noted that the lack of these essential freedoms can occasionally result in economic poverty, thereby preventing people from, for example, exercising the liberty of appeasing their hunger, purchasing medicines or, on a societal level, establishing educational facilities or maintaining law and order (Sen, 1999:4).

The relationship between an individual’s freedom and the attainment of social development is summarised when Sen (1999:5) mentions that various elements are instrumental in peoples’ accomplishments. In other words, social strength, political autonomy, economic prospects, and the facilitative properties of education, health and the fostering of undertakings, influences peoples’ success in reaching their positive goals (Sen, 1999:5). Sen (1999:10 & 11) further points out that the various kinds of freedoms or liberties actually proceed to strengthen one another. These freedoms are not merely the end results of development, but that they are also amid the chief methods used to reach this state. According to him, the methods and results of development need to be investigated and analysed in order to fully comprehend the process of development (Sen, 1999:14).

Sen (1999:14) also adheres to the belief that it is insufficient to focus on increasing income or wealth as the primary goal to be reached in the development process. Instead, development should rather be directed at improving people’s lives and the freedoms at their disposal (Sen, 1999:14). Likewise, Peet and Hartwick (1999:1) describe development as a way of improving the quality of life, while they refer to economics as information pertaining to the productive resources that can aid in building worldly comforts. These authors draw a distinction between development and economic growth. Here they view development as a process that addresses the effects of production (e.g. how economic enterprises affect the environment), as well as the social impacts (e.g. the distribution of income and its role in welfare). Ultimately though, people are able to liberate and enrich their lives, exercise free will, interact with and influence the environment to which they belong, through the development of the various freedoms (Sen, 1999:15). A population’s experience of
growth, development, the freedoms to which Sen refers, and ultimate happiness and wellbeing, rests heavily on hazards and risks produced or encountered in their environment.

Smith (2001:6) defines a hazard as a natural/man-made event/action with the ability to produce loss (e.g. floods, hurricanes, nuclear accidents). Sometimes risk is interpreted as being synonymous with hazard, but a risk is best defined as the likelihood of a hazard occurring and producing loss (Smith, 2001:6). Beck (2006:4) sums up the definition of risk quite appropriately when he states that “Risk means the anticipation of catastrophe”. While a flood hazard, for example, can occur in an uninhabited area, a flood risk can only arise in an inhabited area (i.e. where people and their possessions are found). People’s activities can either increase or decrease hazards or risks, bringing us to the concept of vulnerability. Khan, Vasilescu and Khan (n.d.:45) have defined vulnerability as,

“The extent to which a community, structure, services or geographic area is likely to become damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area”.

A disaster, on the other hand, is described as an ‘actual happening’ that affects, kills or injures large numbers of people (Kron, 2005:60 and Smith 2001:7). Like Kron’s and Smith’s definition of disaster, Beck (2006:4) also defines a catastrophe as a risk that actually happens (or becomes real). The formula that is usually used to express disasters is as follows: Disaster = Risk + Vulnerability (Marianti, 2007:9). Figure 4 provides an example of the connection between vulnerability, hazard and disaster.
Figure 4. Relationship between vulnerability, hazard and disaster.

It was Beck who introduced the term ‘risk society’ to the social sciences in 1992, after the translation of his 1986 German publication. According to Shaw (1995), Beck views modern society as a society that has shifted from one in which the focus was on the disparities of wealth and income, to a society where environmental hazards have become increasingly problematic (even though inequalities still remain). Beck (2006:4) refers to the modern world and describes it as having “... become a risk society in the sense that it is increasingly occupied with debating, preventing and managing risks that it itself has produced”. He aptly adds that natural hazards appear to occur less by chance nowadays, than what they did in the past. Despite the fact that natural hazards (e.g. earthquakes and tsunamis) cannot be controlled by man, they can however be predicted with a fair amount of precision (Beck, 2006:4). Hence, planning and management can be carried out in terms of perceived risk.

Even though Beck may have introduced ‘risk society’ as a term, Giddens has also examined risk as it relates to security and contends that the characteristics of risks
have altered. Giddens, cited in Shaw (1995), views modernity as having a dual purpose, namely that it has:
   a) produced many more prospects for people to take pleasure in the available securities and rewards, than in any other pre-modern system, and it also has a b) bleak, gloomy or negative side.
He also states that there is an increased awareness of risk, as well as a globalisation of risk in terms of:
   a) intensity (e.g. nuclear war), and
   b) the increasing number of causal events that affect nearly everyone on the planet (e.g. changes in global food prices) (Giddens, cited in Shaw, 1995).
Eventually, the environment, as well as the destructive consequences that the dominating development models had on the environment, became the centre of attention for new approaches to national and global development (Estes, 1993:3). By the mid-1980s it was acknowledged that a new model of development was necessary. According to Admas (cited in Khagram, Clark & Raad, 2003:296), the idea of sustainable development can be identified as filtering through the early days of the conservation movement, the 1972 Stockholm Conference on the Human environment and the 1980 World Conservation Strategy. It was only in the 1987 Brundtland Commission report entitled ‘Our Common Future’ that contemporary sustainable development became most visible. Table 1 provides a brief overview of the concept of sustainable development.
Table 1. Outline of sustainable development.

<table>
<thead>
<tr>
<th>What is to be sustained?</th>
<th>What is to be developed?</th>
</tr>
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<tr>
<td>Life support systems: Resources, environment, ecosystem services.</td>
<td>In what relation? Or, and, but, with etc. For how long? Years, decades, centuries, forever. At what scale? Localities, states, regions, planet.</td>
</tr>
<tr>
<td>Natural environments: Species, biodiversity, ecosystems, earth.</td>
<td>Economies: Production, consumption, wealth, distribution.</td>
</tr>
<tr>
<td>Communities: Traditions, values, ethnic groups, cultures, places.</td>
<td>Societies: Capacity building, organizations, institutions.</td>
</tr>
<tr>
<td></td>
<td>People: Longevity, education, capabilities, choices.</td>
</tr>
</tbody>
</table>


The Economic Commission for Africa (2000:1) has defined sustainable development as “... development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. In other words, whatever actions are taken to enhance or bring about development in the present time, must not be detrimental to the process of development in the future. Hence, satisfactory conditions for each individual in the population, needs to be maintained over an indefinite period of time. The aims of sustainable development are summarised in figure 5.

Figure 5. Aims of sustainable development.

<table>
<thead>
<tr>
<th>i) Ecological sustainability</th>
<th>ii) Political sustainability</th>
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<tr>
<td><strong>Sustainable development aims to promote:</strong></td>
<td></td>
</tr>
<tr>
<td>iii) Economic sustainability</td>
<td>iv) Cultural sustainability</td>
</tr>
</tbody>
</table>

With regard to the fields of agriculture, fishery and forestry, sustainable development implies that the degradation of the environment should be avoided and the proper management of water, land, and genetic sources of plant and animal material should be implemented (Economic Commission for Africa, 2000:1). In this way, the ongoing production of key food and non-food products will be secured. In Africa, sustainability and food security are basically founded on the interplay between the condition of the environment, agricultural and population growth. Therefore, in order to reach a state of food security, this interplay between the aforementioned factors needs to be understood at the very beginning of policy-making. In order to assist African policy-makers and planners in their understanding of the connection between population, environment and agriculture, the Economic Commission for Africa (2000:4-6) has devised the Population, Environment, Development and Agriculture (PEDA) model.

Sustainable development was found to present human security with many benefits. According to Khagram et al. (2003:301), the following should be noted.

i. Interventions that are formulated on the idea that nature and society are mutually dependent upon each other are likely to have a higher success rate, than those that choose to separate people from nature.

ii. The interdependent disposition of nature and society produces both threats and benefits to these two components. Interventions and research that mostly target the threats will end up bypassing valuable occasions for combined improvement and the sharing of advantages by nature and society.

iii. Threats and risks are always present; existing in acute and chronic proportions and occurring on local and international levels. However, the preferred attempts to address human security issues in a global context do not result in the same favourable outcomes, as addressing very specific events or conditions. In the same way, greatly extended interventions are less promising to encourage an enhanced state, than short-term of transitional activities.

iv. The affected people and communities should have an opportunity to express themselves and participate in decisions and plans that concern their security
and development. An approach solely commanded by those in authority will probably not be very long-lasting or successful. Advocates of human security would achieve greater results if they permitted those that are affected to determine the most important insecurities and the most suitable ways for solving the problems.

v. The concept of sustainability provides more opportunity for analysis, consideration and action and it could therefore assist to link those involved with human and environmental security with a mutual objective to broaden the areas requiring attention in the field of state security.

Khagram et al. (2003:309) suggests that efficacious change will only be produced when the development and sustainable human security fraternities unite, modify authority issues and display (in practice) that their aims can be accomplished. Brown, cited in Estes (1993:8), recommends the following productive approaches to sustainable development, as outlined in figure 6.

Figure 6. Ideal approaches to sustainable development.

| i) Optimal use of resources that are locally available. | ii) Minimal dependence on resources that have to be acquired from external sources. |
| iii) Conservation of resources that are required for improvements over a long period of time. | iv) Avoid improvements for which the constant introduction of new or current resources are needed. |

Effective approaches to sustainable development must include:

Source: Adapted from Brown, cited in Estes (1993:8).

In closing, this research is fundamentally informed by a humanistic approach. The importance of this approach to human and social development can best be summarised in the notion that society’s wellbeing depends on the wellbeing of its people. The Organization for Economic Development (OECD), cited in Dwivedi (n.d.), has defined human wellbeing as more than the total parts of all the individual
dimensions of wellbeing. This takes into account equal opportunities, economic wellbeing, the allocation of resources, general liberties, possibilities for further learning, social cohesion, health and the conditions of the environment. Basically, in order for a society to function optimally, develop and maintain an ideal level of stability, its population, and more specifically its individual constituents (namely, the people) need to be operating on, and enjoying the benefits of, human security. The concept of human security will therefore be explored later, as a separate topic.

2.2. Climate change and flooding

The human and social dimensions of development are not the only factors requiring attention in this research. Because flooding is used as a construct, the environmental factors (in this case, climate change and flooding) are undeniably applicable as well.

Particularly relevant to this research, is the view that the continent of Africa is one of the world’s most susceptible regions to suffer at the hand of climate change (IPCC, quoted in Riché, 2007). Yet, Africa was found to be one of the lower emitters of greenhouse gases that are responsible for global warming. Scholars, like Akumu, consider Africa to be a ‘victim’ in the process of climate change and increased natural disasters (Akumu, quoted in Okeowo, 2007). Even if this is the case, that Africa is enduring climatic hardships as a result of others’ environmental misuse and/or policy or other blunders, passing the blame onto another actor does not remedy the weather changes that are currently happening. It is crucial that African governments, politicians, scientists, educators, community leaders and the population at large adapt to the weather related problems that are taking place. Holding others responsible for weather, or other, crises only serves to delay the action that is necessary to manage or cope with the difficulties at hand. It is thus of extreme importance that those in positions of power focus their attentions on developing and implementing policies that address the socio-economic impact of extreme weather events, such as flooding.

Another important consideration is that it is difficult to make predictions about future climate change in Africa. The Department for International Development (DFID) (2003:2 & 3) hold that Africa has an intricate climate and a “... lack of data on the
current climate to feed into models”, further complicates matters. The UNDP (2000:44 & 45) have also found that sufficient, good quality data that can be used in climate models, are often lacking. As an example, they identified Mozambique’s National Meteorological Institute of (INAM) weather forecasting as being limited by:

- a mediocre quality of forecasting models, and
- an inadequate quality of inputs for models, because of the few available systemic observation stations (i.e. only 22 such stations in the whole country).

The Tyndall Centre for Climate Change Research predicts that flooding will become more frequent or more intense in many geographical areas over the next 100 years. However, it was not possible for them to predict the exact locations that may experience increased flooding as a result of climate change, because such extreme weather events are also influenced by technological, social and environmental factors (Few, Ahern, Matthies & Kovats, 2004). Likewise, Rosenzweig, Casassa, Karoly, Imeson, Liu, Menzel, Rawlins, Root, Seguin and Tryjanowski of the IPCC (2007:83) acknowledged that both climatic and non-climatic factors exert an influence on natural systems. They have therefore found that it is difficult to determine the exact role that climate plays in the changes that are taking place in the natural world. The IPCC (quoted in Riché, 2007) also holds that the majority of less-developed countries, like Zambia, are particularly vulnerable to climate change because of their economic dependency on sectors like agriculture and natural resources. Again, it is highlighted that these countries’ ability to adapt to such climate changes are further hampered by a lack of financial, human, technological and other resources.

The IPCC, cited in the European Commission Joint Research Centre (ECJRC) (2007:13), attributes variable rainfall patterns across Africa as a result of numerous factors. These factors include:

- deforestation,
- a deviation in regional atmosphere-ocean patterns,
- atmospheric dust loading, and
- land degradation.

They further state that these climate conditions are so intricate, that a concise explanation of what is occurring meteorologically in Africa is not a likely approach.
With specific reference to East Africa, Shongwe, van Oldenborgh, van den Hurk and van Aalst (2008:3) found that periods of both high and low rainfall have occurred in this region and that the frequency of the intense rainfall that causes flooding, has increased. Whenever the sea surface temperatures (SSTs) are warm in the Western Indian Ocean and cold in the South Eastern Indian Ocean, it results in more rainfall in East Africa (Shongwe, et al. 2008:16). In addition, they found that the changes in the 10-year wettest seasons in East Africa indicate that flooding is likely to intensify (Shongwe, et al. 2008:11).

Figure 7 provides a clear indication of the areas in Africa that are most susceptible to flooding. Although some parts of North and West Africa are also shown to experience flooding, this map distinctly presents East Africa as the largest part of the continent that is frequently hit by these weather extremes. Following the eastern belt, from Sudan in the North, to South Africa in the South, these countries have been identified as being prone to flooding.

**Figure 7.** Flood prone countries in Africa.

ENSO is also associated with recurrent flooding in some African countries. El Niño events are known to occur every 3 to 7 years, but it is now argued that the onset of extreme weather events, as a result of climate change, is enhancing the consequences of El Niño (Godrej, 2006:33). ENSO can become evident through either El Niño or La Niña weather events, which are respectively linked to warm and cool SSTs in the tropical Pacific. ENSO episodes may display differences in its frequency and/or degree of severity, because of its dependency on SSTs (Clay, et al. 2002).

An El Niño event is inclined to increase rainfall in eastern equatorial Africa, while south-eastern Africa is inclined to receive a decreased rainfall. La Niña events, on the other hand, produce the opposite effects. El Niño is likely to intensify climate variability as well as provide some predictability of these variations. It also enforces a particular time-related pattern on heavy rainfall periods and droughts (Nicholls, 1997). El Niño episodes usually begin around March-May and last for roughly 12 months. If the Southern Oscillation Index (SOI) is strongly negative in the June-July period, then an El Niño has probably commenced and will continue into the following year (Nicholls, 1997).

In relation to the annual cycle, areas affected by the ENSO phenomenon do not exhibit randomly occurring extended periods of drought or extensive rainfall. Rainfall irregularity associated with ENSO tends to be “phase-locked” with the annual cycle. This means that it starts and finishes around the same time in each event. El Niño events usually start early in the calendar year and finish early in the following year. This phase-locking allows for the development of a time schedule that can be used in the prediction of famine early warning. The change from El Niño-related drought to La Niña-related wet conditions can occur swiftly and lead to other problems. For example, a rapid commencement of wet conditions after an extended El Niño drought can result in soil erosion and cause problems with planting (Nicholls, 1997). Furthermore, Nicholls (1988), cited in Nicholls (1997), found that annual rainfall was circa 30% to 50% higher in regions that experienced ENSO events than in areas that did not. Countries at lower latitudes, with low rainfall patterns (e.g. the semi-arid regions of Africa) seem to have the most affected rainfall variability because of this phenomenon. Even though Nicholls (1997) acknowledges that an increased number
of severe, ENSO-related floods and droughts can lead to food insecurity or famine, he emphasises the social, economic and political factors that may influence this security. Here, he points out that some countries that are afflicted by an ENSO may not necessarily suffer from famine as a consequence (Nicholls, 1997).

According to Nicholls (1997) it is probable that some parts of Africa will be severely impacted during an El Niño event. For example, Uganda is considered to be a highly vulnerable area with regards to climate change and has been found to experience flooding that strongly diverges from the norm. The ECJRC (2007:9) therefore questions whether this flooding is linked to the El Niño phenomenon. Some aspects of these extreme weather impacts can be predicted with the most recent statistical and dynamical models. Institutional arrangements (national and international) to improve these models and to ensure that the forecasts are used to reduce the likelihood of climate-related famine, requires consideration. It is possible to keep El Niño’s devastating consequences to a minimum with refined institutional arrangements and models. Unless the above recommendations are carried out, future El Niño events could have disastrous consequences for Africa (Nicholls, 1997).

In cases where flooding is preceded by another disaster (whether natural or man-made), the occurrence and experience of such flooding is felt even harder by a population that was already made vulnerable by a previous catastrophe. An example of such an occurrence is provided in the Human Development Report 2007/2008, where it was noted that the droughts of 2005 in the Horn of Africa and southern Africa threatened the lives of some 14 million people. The following year, many of the countries that had experienced this drought, were hit by flooding as well (UNDP, 2007:76). These flood-drought cycles generally result in severe water shortages, as less water becomes available for human and animal consumption and agriculture. This directly affects human health as well as crop and animal farming (Humanitarian Futures Programme, 2007:1-15). Some households are able to quickly recover from such natural disasters, while other households may recover more slowly. Very poor households on the other hand, may not be able to recover at all, and they are most likely to spiral below the poverty line (UNDP, 2007:88 & 89). Another complicating factor is that flooding usually has a rapid onset. This may not allow a population sufficient time to prepare for such a disaster as there may be no time to issue early
warnings (Rukandema & Gürkan, 2005). In African regions where there is a lack of meteorological stations, adequate forecasting technology or communication channels, early warning notification may not be received by those who desperately need it. Often it is the rural poor who are left without these services, making them vulnerable to the occurrence of a natural disaster.

Nonetheless, rural areas are not the only regions that are severely affected by flooding. Cities and urban districts can also suffer the hardships resulting from these extreme weather events. Flooding is considered to be one of the main contributors that prevent Africa’s urban population from bypassing poverty (ActionAid, 2006:2-7).

**Figure 8. Effects of urbanisation on flooding.**


For example, ActionAid (2006:4) found that in Uganda, the construction of informal shelters in slum areas contributed to the decreased infiltration capacity of rainfall, resulting in the occurrence of runoff that was six times higher than in a natural setting. Thunderstorm activity can also be increased by urban areas as the built surfaces and dust particles affect the air circulation. As rural people migrate to towns and cities, and the urban population continues to expand, it magnifies the urban
causes of flooding. The urban poor in Africa are becoming increasingly vulnerable to climate change and, unfortunately, they are generally left to cope with weather disasters themselves. Urban flooding, like flooding in rural areas, is responsible for disrupting education and work and spreading diseases. This brings the subject of flooding and human health to the fore.

The impact of flooding on human health plays a major role in the nutritional status of a population. With the increase of illnesses and diseases such as dysentery, cholera and malaria, people can be prevented from taking up wage earning positions or be prevented from working on their own farms. This will in turn lead to a lack of finances, or produce, and consequently limit the consumption of food. The psychological stress of enduring such a disaster is often overlooked, but this too plays an important part in a person’s ability to cope with his/her situation (Few, et al. 2004). Flooding can cause an increase in plant and animal diseases, such as Rift Valley fever and fungal infections, thereby decreasing the amount of food available for consumption by destroying crops and herds.

ActionAid (2006:5) found that some African countries have ministries in place to deal with issues relating to disaster preparedness and response. The Ugandan government, for example, aims at working together with donor organisations, local communities and non-governmental organisations, in order to rescue lives, safeguard means of subsistence, lessen Uganda’s vulnerability, and in so doing, ultimately control or lessen the socio-economic impacts of a disaster. The Ugandan strategy is especially directed at alleviating dangerous scenarios (e.g. by not building in dangerous locations) so that disasters may be avoided. Despite this finding though, an interview survey carried out in six other African cities, revealed that there is an absence of systems and strategies for either reducing or managing flooding (ActionAid, 2006:2). Again, various factors may complicate the successful execution of development goals. Many African countries were found to have a disaster management plan in place on a national level, but their capacity to carry out these plans is inadequate. On a regional level, inadequate resources to execute optimal disaster relief may hamper strategies that have been established. Also, local governments’ attempts to prevent building in areas that are at risk of flooding are
often hindered by an inability to ensure that building regulations and other development plans are adhered to (ActionAid, 2006:6).

A shortcoming in the understanding of weather and climate patterns lies in the fact that events are often unreported, under-reported, or inaccurately reported and recorded. The ECJRC (2007:14) found that some African areas that had experienced flooding in 2007 were not mapped and that the mapping varied in accuracy. They also hold the opinion that the extent of the 2007 flooding in Africa may have been overestimated because of poor attention to detail. Vordzorgbe (2007:4) substantiates these arguments, as he too attributes the unsatisfactory standard of disaster risk assessment in Africa to:

- the lack of data collection regarding hazards,
- the omission of natural hazard risks from land use capability maps, and
- the general unavailability of risk maps.

In addition, even with all the technological advancements taking place in the area of risk management (e.g. in countries like Western Europe, USA and Japan) the transfer of knowledge to developing countries is not taking place. Instead of a reduction in risk, an increase in death and economic turmoil has been occurring globally (Shah, 2008:112). The insufficient communication between knowledge producers and knowledge consumers has been identified as one of the reasons for the knowledge gap. Shah (2008:112) points out that appropriate affiliations, and not merely “... experts talking only to experts”, are as important as developing a country’s knowledge base for risk reduction.

Shah (2008:111), holds that even though the last thirty years have witnessed a progressive advancement in the understanding of the causes and observed processes of disastrous events (e.g. hurricanes, earthquakes and floods), it has not made an apparent impact on the understanding of the consequences of these events (particularly in developing countries). The following are three reasons, as identified by Shah (2008:111), for the lack of understanding pertaining to the consequences of catastrophes.

i. The ability to assess the social, political and economic outcomes of disastrous events has not been advanced. Information about the demography and material infrastructure of the populations at risk is fairly restricted and
considerable uncertainties still exist with regard to the social and physical susceptibility of the affected populations.

ii. The ability to explain the social, political and economic consequences of disasters in public policy decisions is quite unprofessional. It is often the science and technology professionals who execute work related to vulnerability analysis, the observation of disaster occurrences and risk assessment. Unfortunately, because these professionals lack knowledge about policy formulation and the social, political and economic arenas, they are not qualified to relate risk to public policy.

iii. There is usually very limited interaction between experts and the society at risk.

The following actions have been found to enhance a country or region’s competence in improving their catastrophic risk during earthquake disasters (Shah, 2008:116). These recommendations can also be easily applied in the context of flood disasters. Hence, the term ‘earthquake’ has been replaced by ‘flood’ so that its relevance to this research can be illustrated. The actions that were found useful are, namely:

i. The preparation of all divisions of private and public agencies/institutions for subsequent disasters.

ii. A favourable attitude and performance, presented by the government, when imparting knowledge about the cost and benefit of utilising procedures to alleviate the impact of disaster. Policies, with proper incentives, that encourage people at risk to take mitigation measures should also be formulated.

iii. Awareness by individuals, families and communities, of the procedures to follow before, during and after a flood.

iv. Assistance, in villages or communities, with the construction of safer homes, hospitals, schools and other community infrastructures.

v. Instructions regarding how to build non-engineered and rural structures.

vi. The strict implementation of flood codes for engineered constructions in urban and rural areas.

The UNDP (2007:1) holds that “Climate change is the defining human development issue of our generation”. The reason for this is because climate change is
endangering development by restricting choices and disintegrating human freedoms. The poor are basically hampered in their attempts to create a better life for themselves and their children by their susceptibility to extreme weather events, like storms, floods and droughts. As a result, climate change is impeding the aspirations to attain the MDGs (Stern, 2007:114 and UNDP, 2007:1). Even more troublesome, is the possibility that it will halt, and then counter any growth and development that has already been produced. Considering the rate and extent at which climate change is occurring, there is indeed a great danger that such a reversal in development can occur.

The above discussion demonstrates that climate change and extreme weather events should not be studied in isolation from its corresponding social and developmental context. This opinion is supported by Shah’s (2008:116) acknowledgement that the application of technical solutions alone, to a complicated social, political and economic difficulty, carries very little probability of being relevant or useable. Furthermore, an understanding of how weather phenomena may influence climate variability is viewed as imperative with regards to Africa, and is recommended to be further investigated (Boko, Niang, Nyong, Vogel, Githeko, Medany, Osman-Elasha, Tabo & Yanda, of the IPCC, 2007:436 & 437). African farmers in particular, require research and support so that adaptation to weather changes, pests and other challenges can be accomplished (DFID, 2003:5).

In order to hinder considerable negative consequences from climate change and to foster valid responses to these impacts, the climate elements would need to be incorporated into development policies. Ultimately, this approach would serve to promote climate change risk management in Africa (Vordzorgbe, 2007:6). The urgency surrounding climate change is probably best portrayed in the recognition that it carries serious human security implications, which consequently have a critical bearing on global threats (The Women’s Environment and Development Organization (WEDO), 2008:1). The influence of climate change on human security and development can therefore be identified as an important area that requires consideration and further exploration.
2.3. Human Security

The concept of human security was first coined in 1994 when the UNDP, cited in Nef (1999:24), clearly tied the study of human development to the idea of human security. Nef’s (1999:24) definition of security is founded on the likelihood of risk reduction or, stated differently, the decline of insecurity. This definition stresses that the effects of insecurity should be avoided, instead of focusing on the methods used to control the evidence of problems.

According to Alkire (2003:13), the term “human security” (formulated and advocated by Mahbub ul Haq) is commonly identified with the 1994 Human Development Report on Human Security, even though it was in use earlier. The 1994 UNDP report developed a definition of human security based on seven dimensions as illustrated in figure 9.

**Figure 9.** The seven dimensions of human security.

![Diagram of human security dimensions](source: Alkire, 2003:14)

The UNDP report defines human security as:

- safety from constant threats (e.g. disease and hunger), and
- protection from unexpected and harmful interruptions to life patterns (whether in the home, workplace or community) (Alkire, 2003:14).

According to Alkire (2003:2), the aim of human security is to protect the essential crux of all human existence, from grave universal hazards or threats, in a manner that is compatible with human gratification over a long period of time. Human security and human rights are thus tightly connected (Alkire, 2003:7). Moreover, the following seven traits are characteristic of human security, namely that:
i. it is intentionally protective. That is, it acknowledges that individuals and communities are at the peril of incidents which are out of their control (e.g. terrorism, financial crisis, earthquake) (Alkire, 2003:2 and Commission on Human Security, 2003:11);

ii. the focus of human security is on people, irrespective of their age, gender, ethnicity, religion, or other characteristic features, hence it is known to be “people-centred”;

iii. it has a universal nature, that is, it is applicable to all people irrespective of whether they belong to rich or poor nations;

iv. the constituent parts are dependent on each other;

v. it does not inhibit state security, nor does it include the entire security plan (e.g. it may not contain aspects related to the division of power between nations);

vi. a charitable cause is not required to act as a stimulus, and neither does it need to be undertaken;


A large number of threats exert a greater impact when they arrive unexpectedly (Alkire, 2003:2). It is therefore essential that those who participate in human protection should establish and anticipate perceived threats so that they may be dealt with efficiently (Alkire, 2003:4). For example, crop loss as a result of flooding can be decreased with early warning and the destruction of built structures can be reduced with flood-proofing. Institutions are thus encouraged, in the human security approach, to propose protection which is structured, ready to respond and comprised of preventive measures. Hence, people will be able to “face inevitable downturns with security” (Alkire, 2003:2). Figure 10 illustrates the characteristic features of these threats to human security.
Human security lies parallel to the concept of human development. The objectives of human development arose from the basic human needs approach. Like human security, human development is person-centered, applicable to any country irrespective of their prevailing conditions, interested in the basic freedoms people appreciate, contains multiple dimensions and addresses chronic poverty (Alkire, 2003:35 & 36 and Commission on Human Security, 2003:10). The Human Development Index (HDI) is used as a tool to measure human development. A low HDI (e.g. in countries like Zambia) is considered to indicate low human development, while a higher HDI (e.g. in countries like Norway) is considered to indicate a higher human development. The UNDP (cited in Saad, 1999:3) utilises the following eight indicators to measure food security at a national level, namely:

i. food production per head,
ii. agricultural production as a percentage of gross domestic product,
iii. food consumption as a percentage of total consumption,
iv. daily calorie intake,
v. food supply from fish and seafood,
vi. food imports,
vii. cereal imports, and
viii. food aid in cereals.

The data are however, merely estimated averages on a national level and they do not specifically represent food security at a household level, nor do they show an individual's different approaches to obtaining adequate food and a balanced diet (e.g. the data does not differentiate between pregnant and non-pregnant women) (Saad, 1999:3). According to Saad (1999:3), averages are often not useful for policy development aimed at eliminating food insecurity and malnutrition at the community and household levels. The main differences that occur between human security and human development are outlined in Table 2.

Table 2. Differences between human security and human development.

<table>
<thead>
<tr>
<th>Comparison of Human Security and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human security</strong></td>
</tr>
<tr>
<td>Objectives are limited by boundaries.</td>
</tr>
<tr>
<td>Addresses threats directly, with a focus on preventing, mitigating or coping with it.</td>
</tr>
<tr>
<td>Aimed at long-lasting change, but some activities may occur within a short period of time (e.g. emergency relief for flood victims).</td>
</tr>
</tbody>
</table>


Like Maslow, Nef defines the various dimensions of security in terms of a hierarchy, as presented in figure 11. Nef (1999:24) states that the higher ranking levels of
security are dependent on attaining security on the lower levels. Five classifications of subsystems emerge (UNDP, quoted in Nef, 1999:25), namely the ecosystem, economy, society, polity, and culture.

**Figure 11.** Dimensions of human security.

<table>
<thead>
<tr>
<th><strong>CULTURAL SECURITY</strong></th>
<th>• The collection of psychological adaptations of society that are aimed at protecting &amp; improving the capacity to govern fear &amp; uncertainty.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLITICAL SECURITY</strong></td>
<td>• The right to autonomy, representation, participation &amp; disagreement, as well as the possibility to make decisions that effect change. An individual’s right to justice &amp; protection from abuse is also included here.</td>
</tr>
<tr>
<td><strong>SOCIAL SECURITY</strong></td>
<td>• Liberation from discrimination related to gender, age, social position or ethnicity. This includes access to information, knowledge and protection, &amp; the possibility to affiliate.</td>
</tr>
<tr>
<td><strong>ECONOMIC SECURITY</strong></td>
<td>• Employment opportunities, access to resources to maintain the material quality of life &amp; reduce scarcity.</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL, PERSONAL &amp; PHYSICAL SECURITY</strong></td>
<td>• Protection of life, health, and the possibility to live in a safe and sustainable environment.</td>
</tr>
</tbody>
</table>


Although all of the various dimensions of security play a significant role in the culmination of human respect and esteem, Nef holds that the political aspect is central to ensuring the protection of the others (Nef, 1999:25 & 26). The ability of a state to manage conflicts (or govern) successfully is more instrumental in overcoming crises and providing protection and safety for its population, than its supply of assets and infrastructures, or independence. This viewpoint highlights the importance of the political role in achieving and maintaining human security. As a result, the corresponding political features should not be overlooked when examining developmental concerns. Be that as it may, the environmental dimension of human security will be examined in greater detail, as it is particularly relevant to this research.
According to Adjibolosoo (1999:49) the climatic school of thought holds that the development programme of a nation is considerably influenced by climate. A tropical climate is considered to be quite detrimental to development, while a more temperate climate is regarded as being more favourable. Stern (2007:94) also acknowledges the role that geographical conditions play in the growth of developing countries, while Kamarck (cited in Adjibolosoo, 1999:48) proposed that the tropical climate provides one of the cardinal explanations for the failure of development in many countries. However, Karmarck did recognise the fact that a tropical climate does not inevitably hinder development completely, but that it should be taken into account in the development programmes of countries situated in the tropics. This viewpoint is particularly relevant to Africa because many countries on the continent experience a tropical climate, of which Mozambique is one.

WEDO (2008:5), also acknowledge that “The nature and extent of climatic changes not only hinders human development and environmental conservation, but also forms a major threat to human security at national and livelihood levels”. This view supports the conclusion reached by prominent persons like David King (the chief scientific advisor of the British government) and Peter Randall (from the United States Department of Defence) in 2004, that climate change is an immense threat to security on a national and global level (Brauch and Russell & Morris, cited in WEDO, 2008:5).

Khagram et al. (2003:289) also consider the link between human security and the environment to be intricate and closely connected, and they propose that the scope of security should be expanded and viewed in terms of sustainable security. The idea of environmental security and sustainable development, did however, evolve during roughly the same time as ideas about human security and development (Khagram, et al. 2003:292).

Various interpretations and understandings of environmental security surfaced during the last 20 years. One such viewpoint pertains to the relationship between environmental threats and human security (that is, survival, wellbeing and efficiency in production) (Khagram, et al. 2003:293 & 294). Here, people and social bonds are regarded as in need of being secured, and not the states. In short, Khagram et al.
have recognised that environmental change can have a variety of direct, immediate impacts on people’s lives, which can extend into the future and have widespread consequences across a broad spectrum (i.e. from the household to planetary level). The impact of climate change in relation to human security is best summarised in table 3 (Dankelman, cited in WEDO, 2008:14).

Despite their findings, Khagram et al. (2003:294) proceed to alert readers to the dangers of only focusing on threats. Directing the attention in such a limited way can lead to the exclusion of environment-related possibilities, which can be used to enhance human security. Their statement that, “Protecting and enhancing the environment can have very positive consequences for people’s livelihoods, wellbeing and opportunities for fulfillment” supports this view (Khagram, et al. 2003:294). They additionally emphasise that the connection between a population, nature and the economy are unavoidable when considering how environmental risks and security apply to human security. Therefore, in order for human security and development to be fruitful, it should be founded on functional measures that embrace the opportunities offered by the environment (Khagram, 2003:296).

As already discussed, climate change and environmental degradation can manifest itself in an array of clearly visible conditions, which includes drought, soil erosion, flooding, decreasing water tables, storms and the extinction of plant and animal species. In order to foster an understanding of how climate change affects human security, table 3 has been included as a summary of the effects of climate change on human security. Furthermore, Adjibolosoo (1999:49) recognises the notion that not much advancement will be realised in developing countries if climate change is not addressed adequately. This reasoning augments the problems experienced in these countries and it also suggests that there are possibly no feasible procedures with which to solve their problems. Worst of all, even though some solutions may exist, developing countries are not able to afford them because of a shortage of expertise and financial and human resources (Adjibolosoo, 1999:49).
### Table 3. The effects of climate change on human security.

<table>
<thead>
<tr>
<th>Human Security &amp; Climate Change</th>
<th>Human Security</th>
<th>Security Aspect</th>
<th>Effects of Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Security of survival</strong></td>
<td></td>
<td>Mortality/injury</td>
<td>* Mortality through different extreme weather events</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health</td>
<td>* Increased infectious diseases vectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Physical and mental stress</td>
</tr>
<tr>
<td><strong>Security of livelihood</strong></td>
<td></td>
<td>Food security</td>
<td>* Agricultural production changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Fishery stocks decrease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water security</td>
<td>* Lack of water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Pollution and salination of water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Flooding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy security</td>
<td>* Lack of biomass fuel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Dysfunctioning hydropower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental security</td>
<td>*Environmental processes and services jeopardised</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shelter security</td>
<td>* Housing, infrastructure and services destroyed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic security</td>
<td>* Decreased income generating and credit opportunities</td>
</tr>
<tr>
<td><strong>Dignity</strong></td>
<td></td>
<td>Basic human rights</td>
<td>* Triggers violation of basic human rights: stress factor increases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity</td>
<td>* Lack of education and income generation opportunities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation</td>
<td>* No/limited part in decision making; lack of information</td>
</tr>
</tbody>
</table>

Besides other authors, Nef (1999:32) too holds that environmental degradation is affiliated to food insecurity which is predominantly displayed as poverty, malnutrition and hunger. Similarly to Maslow’s hierarchy of needs, Nef’s description of human security contains themes related to survival in the first level (i.e. the level dealing with environmental, personal and physical security). The element of food security therefore belongs to this level, as without it, individuals would not be able to sustain their health and life. White, cited in Nef (1999:27), presents a valuable example of how environmental degradation contributes to increased food insecurity. White’s ideas are outlined below in the following diagramme.

**Figure 12.** Example of the process of environmental degradation in relation to food security.

![Diagramme showing the process of environmental degradation and its impact on food security](Diagramme)

Source: Adapted from White, cited in Nef, 1999:27.

White’s example of the impact of environmental degradation on food security ties in with the problem statement of this research, in which food security in Africa is
considered to be directly and indirectly affected by recurring flood events. However, the following section on food security will show that climate or natural events are not the only determinants that disrupt its stability.

2.4. Food security

It is predicted that food security in many African regions will be severely impacted by climate change and climate variability (Boko, et al. 2007:435). In 2002, the World Food Programme (WFP) estimated that already about 38 million Africans had their safety, peace and security threatened by this crisis (Clover, 2003:6). Millions more are predicted to face hunger and malnutrition in Africa in the coming years, as a result of climate change and its associated increased desertification, water shortages and extreme weather events. The substantial losses in agricultural production, as a result of disasters, will ultimately promote malnutrition and decrease poverty reduction efforts. However, much of the consulted literature does not view emergencies, whether natural or man-made, as the sole contributing factor which threatens a population’s food security. Climatic variables in particular, are considered to have “... limited explanatory power compared with the political and socio-economic context...” (Young, 1997:118). In short, climate extremes are viewed as the initial stimulus, or the ultimate impact, which plunges an already vulnerable population into a state of famine and food insecurity, and not as the main cause (Lappé, Collins & Rosset, 1998:4-16). It is thus important to draw a distinction between the immediate (e.g. natural disasters) and the extended (e.g. socio-economic) causes of food insecurity when trying to understand the origins of a population’s hunger.

Particularly noteworthy is the UNDP’s (2007:86) view that a decline in a population’s nutritional status is a good indicator that the employed coping strategies are unsuccessful and coming to an end. Additionally, when a food crisis occurs, a population’s migration in search of food, trade possibilities, financial opportunities or markets, is often the first sign that a problem exists (Young, 1997:138). A population’s already desperate situation can be swiftly worsened when their possibility to migrate is restricted because roads, bridges, livestock and/or possessions have been destroyed by forces like flooding. Figure 13 provides a brief overview of some of the factors that may impact a population’s food security status.
Figure 13. Examples of factors that influence food security/insecurity.

<table>
<thead>
<tr>
<th>Environmental: Unfavourable weather conditions (e.g. drought, floods, storms), land degradation (e.g. soil erosion).</th>
<th>Political/Institutional: War and conflict, unsatisfactory leadership and policy decisions, corruption, greed and aid.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social:</strong> An individual's position in society, gender, age, HIV/AIDS, tradition.</td>
<td><strong>Economic:</strong> A country's financial crisis, unemployment, available assets and skills.</td>
</tr>
</tbody>
</table>

Sources: Clover, 2003:7 & 8 and Young, 1997.

Although various explanations relating to the topic of food security abound, the common thread is that it is nevertheless the interplay between the many factors that weakens a population’s food security status. Hence, even though the constraints and/or factors that affect food security have been divided into categories for easy reference, it should be borne in mind that they are interconnected and exert an influence on each other.

a) *Environmental factors*

The environmental factors that affect food security are numerous. Some of the effects of climate change, such as the El Niño phenomenon, have already been discussed under the sub-heading dealing with climate change and flooding.

With specific regards to agriculture, the following examples provide a glimpse into its relationship with the changing weather. It was found that:

- A temperature rise during the germination phase of plants can have a negative impact on the crop.
- Positive impacts may be experienced during the growing stage of plants with an increase in temperature.
- A 1cm increase in mean annual runoff can be beneficial for crop yields (de Wit, 2006).
- Wheat production may be obliterated from Africa by 2080 (Boko, et al. 2007:448), resulting in grain shortages.
Uganda may lose available land for coffee growing if average temperatures increase by 2 degrees Celsius. This condition would result in decreased cash crop production in the country (UNDP, 2007:92).

According to an Inter Academy Council Report, the combination of soil fertility and water management emerged as having a more constraining effect on agricultural growth, than crop genetics assistance (Binswanger-Mkhize, 2008:35). It is also suggested that the inadequate systemisation of seed in Africa hampers a farmer’s access to enhanced genetic material, thereby limiting the aims of development. Environmental research and the study of soil management and crop production only play a supportive role in increasing agricultural production. What is apparently most needed is government investment, swift development in the private sector and policy alteration (Binswanger-Mkhize, 2008:35). Keeping the above relationship between climate change and agriculture in mind, Africa has been identified as the region where people are severely impacted by the dramatic decline in per person grain production (Brown, 2004:6). Brown (2004:185 & 186) holds the opinion that water, cropland, rangeland and the climate needs to be brought into equilibrium in order to secure future food security. Although he emphasises the importance of addressing all four areas simultaneously, he also recognises that an attempt to address any one of these areas is a great challenge for financial and other resources.

Agricultural water use is generally very wasteful in both developed and developing countries. If issues such as those relating to water competition and more efficient water use are not addressed globally, then Africa may very well suffer from rising food prices because of growing global water shortages (Binswanger-Mkhize, 2008:41). Water scarcity in Africa is on the rise, carrying many developmental implications for the continent. According to the Africa Development Report (quoted in Binswanger-Mkhize, 2008:41), by the year 2025, nearly 50% of Africans will be living in areas experiencing water shortages or water burdens.

Apart from crop and livestock farming, fishing is also impacted by the changing weather. Loss of fishing equipment (e.g. boats and nets) can occur from extreme weather events like cyclones and flooding. The increasing temperatures and acidic levels of water affect the entire aquatic system, ultimately leading to a decline in
catches (Godrej, 2006:82). An astonishing forty-two constraints to African aquaculture development have been identified in national studies. Most of these limitations apply to social and human, and public administration and organisation constraints (e.g. shortage of databases and statistics, limited budgets, inaccessible credit facilities, the lack of trained personnel, unavailability of ingredients for fish feeds and high transport costs) (Coche, Haight & Vincke, 1994). Restrictions in the supply of fish and fish products have negative connotations for both food security and economic growth.

Apart from climatic change, there are also numerous effects brought about by man’s interference in the natural world. For example, increased urbanisation and modernisation, deforestation, altered land use and population growth are some of the elements attributed to man, that change ground cover, degrade the environment and affect entire ecosystems (Godrej, 2006 and Rosenzweig, et al. 2007:83).

b) Political factors
Morris, the executive director of the WFP, is quoted in Clover (2003:14) as stating that “In the end hunger is a political creation and we must use political means to end it”. Scholars, leaders and communities in Africa therefore require principal involvement in decision making processes, so that positive results relating to food security may be achieved (Clover, 2003:14).

Young (1997:2) too makes her stance about world hunger very clear early in her writings, when she states that “... hunger persists because of the political will to eliminate it is lacking”. Like Young (1997), Lappé, et al. (1998) and Boko et al. (2007) also identify economic, political and social factors as the leading cause of food insecurity. Lappé et al.’s discussion of the famine in the African Sahel illustrates this. According to these authors, it was not the weather-related factors (e.g. drought) which caused the famine, but the man-made ones (e.g. war) that led to food insecurity in the region (Lappé, et al. 1998:17-23). In short, climate extremes are viewed as the initial stimulus, or the ultimate impact, which plunges an already vulnerable population into a state of famine and food insecurity, and not as the main cause (Lappé, et al. 1998:4-16). It is thus important to draw a distinction between the
immediate (e.g. natural disasters) and the extended (e.g. socio-economic) causes of food insecurity when trying to understand the origins of a population’s hunger.

Lappé et al. (1998:8) are of the opinion that there is actually a large enough global food supply to feed every person in the world. Yet, millions continue to starve to death on a daily basis. It would therefore appear again that governments, and other agencies, are not doing enough to eliminate hunger. Corruption, greed and poor resource management have often been to blame for the huge divide between those who are fed and those who go hungry. The Bangladesh famine of the 1970’s, which was caused by flooding, provides an apt example. Researchers found that even though Bangladesh suffered devastating floods, there was not a shortage of food. Rather, it appears that those in power, or sellers in privileged positions, took advantage of the situation and accumulated and hid stores of food instead of making it available to the general population (Lappé, et al. 1998:9 & 10). During times of war and conflict, food may actually be used as an instrument of war. For example, Clover (2003:9) found that the Angolan and Sudanese populations experienced widespread starvation during times of unrest, because aid organisations could not reach them with relief supplies and also because the governments concerned purposefully victimised their people. In addition Devereux, cited in Clover (2003:9), mentions that most of the food crises in the 1980s and 1990s, in the Horn of Africa, could be assigned to the governments’ antagonism to its’ distressed population or by poor alliances with the international milieu.

Like other authors that have been presented previously, Brown (2004:187) too, turns our attention to the political leaders that play an important role in the skilful management of arduous tasks, such as addressing climate change and the use of shared water sources. He further points out that the issue of food security is no longer the sole responsibility of the ministries of agriculture. Instead, ministries such as those dealing with health, transport, energy and water are seen as also playing an important role in matters surrounding food security. However, these national ministries or institutions contain their own shortcomings as well. For example, Vordzorgbe (2007:5) found that while African countries have developed national contingency and evacuation plans, the quality of these plans appear to fluctuate and most countries are incapable of rehearsing the contingency plans. Many countries
were also found to have a shortage of primary facilities for the arrangement, command and supervision of emergency responses. These pitfalls on a national level would all subsequently impede the affected population’s ability to protect their wellbeing, and specifically their food security, before, during and after flooding.

Krueger (1990:10) discovered that in many countries, “… government failure outweighed market failure”. The following are some of the government failures that were identified:

- deterioration of transport, communication and infrastructure facilities;
- engagement in various manufacturing and/or other economic projects not usually undertaken by the public sector (e.g. the state ownership of retail outlets and luxury hotels and state operation of mines);
- nationalised banking and insurance activities; and
- import licensing and exchange controls.

Ite (2003), similarly to other authors and scholars, also identified corruption, political instability, inappropriate policies, inadequate legal and legislative backing and a lack of planning, as important political constraints on sustainable development in sub-Saharan Africa. In addition, he recognised the influence of colonialism on development (Ite, 2003). At the end of the day, many programmes and policies that had been aimed at assisting the poor were found to be more advantageous to the wealthier members of society (Krueger, 1990:10).

c) Institutional factors
Non-governmental institutions, like their governmental counterparts, play a vital role in addressing issues relevant to human and food security. Their presence can be noted in fields concerned with education, research, technology, agriculture, science and business, to name a few.

With specific regard to agriculture, Binswanger-Mkhize (2008:24 & 25) acknowledges that farmer’s associations can provide much needed assistance to smallholders that require fiscal loans from financial institutions or from agribusinesses. However, Binswanger-Mkhize (2008:24) found that insufficient political commitment to agricultural and rural development, in Africa, is partially to blame for the insufficient
development of farmers’ organisations. On the other hand, these associations serve to encourage political commitment to agriculture. Agricultural producers that affiliate with organisations or cooperatives, reap the advantages of a stronger negotiating position by:

i. being represented in decision making assemblies,

ii. increasing the assortment and quantity of products,

iii. having the possibility to make bulk purchases and negotiate reduced prices, as well as by

iv. decreasing transportation and storage expenses.

A World Bank study found that farmers’ associations in Nigeria, Mozambique and Zambia were still fairly underdeveloped and that very few of them could actually provide vital services to their members. Furthermore, their political influence appeared moderate and they displayed a feeble ability to represent their members in the agro-industry (Binswanger-Mkhize, 2008:25).

Brown (2004:191 & 192) however, suggests that apart from solely consulting with experts that have agricultural knowledge, others such as meteorologists and hydrologists should be referred to as well. Such a holistic approach is probably the most beneficial in order to secure optimal crop yields and future food security. This is especially relevant for the African farmers who have developed indigenous methods of weather forecasting to help them in crop production (Boko, et al. 2007:456), because these systems can be threatened by the unpredictability and variability brought about by the changes in climate and weather patterns. Just as Brown (2004) proposes the involvement of various sectors in establishing food security in a country, Young (1997:166) also recommends a combination of international, national and community level input to ensure the successful elimination of hunger. Such an approach would benefit trade, economic, international, political, social, and/or non-governmental relations, to name a few, in the attempt to abolish food insecurity.

The work and policies of institutions or organisations (e.g. Food Gardens Foundation) that promote the establishment of community or household food gardens as a solution to hunger, is challenged by the opinions presented by Rukandema and Gürkan (2005). According to these authors, “… self-sufficiency in food is not necessarily a good indicator of food security”. Even though many of these initiatives
may be successful, it still does not guarantee that growing one’s own food will secure one’s access to food. Here, one remains reliant on weather patterns, plant and animal diseases, labour availability, social/family status, and the like. The same is true of households that are dependent on livestock for food sources. However, for many in Africa, attempting to support oneself with home produce may very well provide the only possible means for acquiring food. In the same manner, food assistance and/or aid may be the only way to obtain food during a disaster.

The Food and Agriculture Organization (FAO) (cited in Clay, Pillai & Benson, 1998:8 & 9) has suggested a differentiation between international food aid and food assistance. International food aid is associated with supplying food as goods or funds for purchasing food for direct distribution by an international aid agency or NGO. Food assistance, on the other hand, is related to government and NGO interventions that are directly involved in providing food or supplying funds so that food can be obtained within the provincial or national economy. The following diagramme describes the three types of food aid that have been identified by Clay et al. (1998:8 & 9).

**Figure 14. Types of food aid.**

| PROGRAMME FOOD AID | • Commodities are provided directly to the beneficiary government or its representative for sales on local markets. | • It does not provide food assistance. |
| RELIEF FOOD AID | • It is usually freely distributed. | • This type of food aid probably has various market consequences depending on whether the goods were imported or purchased locally. |
| PROJECT FOOD AID | • It can be administered as wages for food-for-work programmes or supplementary feeding initiatives. | • It can also be administered in the form of cash. |


Programme food aid can have a positive impact on poverty when it assists economic progress. It could also possibly aid development through the production of counterpart funds or through the supply of food assistance. However, it has been
found to be ineffective in improving the household food security status of the very poor. Sometimes, the subsidised distribution of commodities is purchased for use as animal feed instead of for human consumption. Programme food aid has not proven to be more successful in alleviating poverty than other types of aid. Hence, donors have often chosen other methods of food aid which can, theoretically, target specific groups that can receive the most benefit from such interventions (Clay, et al. 1998:32 & 33).

Relief food aid is delivered free of charge to populations that have been affected by a crisis (e.g. a natural disaster or war). The structure of relief food aid operations depend on the type of emergency encountered. For example, it can be provided to prevent morbidity and malnutrition in emergencies which occur suddenly (e.g. floods) or it can be provided to support livelihoods during crises that have a slow onset (e.g. drought). It is important though, that relief efforts support the process of development and its associated goals (Clay, et al. 1998:41). This kind of food aid has been found to be highly beneficial in saving lives, preventing mass migration and avoiding political instability. On the down side, relief food aid can result in the targeted population developing a dependency on the food distributions. It is thus essential that donors remain alert for any signs that indicate a possible dependency. They should also keep a flexible approach to the provision of aid, so that they can change their strategies in order to avoid or overcome such a problem. Furthermore, the domestic food production’s rate of recovery has to be taken into consideration when the discontinuation of relief aid is envisaged. The continuous evaluation of such interventions is therefore absolutely necessary (Clay, et al. 1998:42 & 43).

With regards to project aid that utilises manpower, Burki et al., was cited in Clay et al. (1998:33), as having stated that labour is the “... single greatest resource that most people have...” and they further add that “... this resource can be utilized to address the problems of poverty and hunger, mediated by labour-intensive works”. These ‘labour-intensive’ undertakings can range from relief projects that offer short-term wage earning opportunities during crises, to more long-term employment schemes that are intended to supply the most vulnerable population with a more secured livelihood.
As far as food and livelihood security is concerned, the results of such work programmes are ultimately dependent upon the conditions in which they were carried out (Clay, et al. 1998:33). Such programmes have been acknowledged as being successful in, for example, preventing migration and seasonal malnutrition, but problems have surfaced when short-term goals (e.g. providing food for the hungry) have also been aimed at providing long-term support. According to Clay et al. (1998:34), projects that are aimed at utilising labour should focus on either short-term or more long-term sustainable intervention, in order to be effective. In addition, it has been noted that these programmes often do not reach, or benefit, those for whom they are intended (Clay, et al. 1998:35). Although payment can be made either as cash or food, the selected method should be determined by the circumstances within the community. This decision should include market conditions, the manner in which food is consumed at a household level, as well as the accompanying impacts on the vulnerable groups that are not participating in the programme (Clay, et al. 1998:36).

Project food aid can also take the form of a school feeding or a supplementary feeding programme. School feeding programmes are generally concerned with the distribution of food supplements to primary school children. These programmes have however been implemented in secondary schools, colleges and universities. Apart from being aimed at improving the nutritional status of individuals, these projects are also intended to improve cognitive function, academic performance, enrolment and attendance. Although these school feeding programmes may fall short in that they do not necessarily reach the neediest they have had important implications for promoting sustainable development. Supplementary feeding programmes cover a wide scope, and can include mother and child health, therapeutic feeding and vulnerable group feeding programmes (Clay, et al. 1998:38 & 39). Depending on its’ execution, supplementary feeding interventions can produce results that are either a success or a failure. The most important point to bear in mind though, is that this type of intervention can save lives during a crisis (Clay, et al. 1998:40 & 41). Both school feeding and supplementary feeding programmes received negative evaluations in the 1980s, leading to the neglect of these programmes. Recently though, its’ importance has been re-examined (particularly in terms of development) and their usefulness have therefore been re-considered (Clay, et al. 1998:38-40).
Clover (2003:14) holds that it is not justifiable anymore, for the global community to “... throw money at the problem of widespread hunger”. Arranged humanitarian action is not the only desired goal. Instead, a more deliberate procedure is mandatory in establishing and actualising productive international, national and community food security policies (Clover, 2003:14). In order to address the causes of food insecurity, it is absolutely necessary that the growing inadequacies of organisational frameworks are recognised. Actions taken to attend to the problem should merge various elements (e.g. the combination of food aid and new farming methods, while executing HIV/AIDS prevention and treatment programmes) (Clover, 2003:14). Be that as it may, humanitarian actions in the form of food aid or food assistance programmes, irrespective of their effectiveness at a developmental level, may be the only solution to ensuring people’s survival during times of crisis. Without such a necessary intervention, thousands (if not millions) could simply starve to death in the wake of a catastrophic event.

Many problems still exist in the administration of emergency assistance, but fresh approaches that connect relief responses to development processes are surfacing (Vordzorgbe, 2007:5). In addition to charity, an individual’s protection (i.e. human security) is just as important if an all-inclusive security is to be attained. Aspects of international, national and human security are corresponding to, and merging with, each other (Clover, 2003:14). It is therefore becoming increasingly “... in the interest of all countries to establish a more equitable world” (Diouf, quoted in Clover, 2003:14). The critical connection between relief and development is discussed as a separate topic later in this chapter.

d) Technological factors
According to Young (1997:150), the current scientific and technological trends are not aimed at reducing the hunger problem. Both Young (1997:150) and Lappé et al. (1998:1) hold that increased food production is not necessarily the required action to take in order to eliminate hunger. Food production does however need to be maintained, so that the consequences of severe shortages can be avoided. The technological divide in African agriculture, is considered to be the most alarming of all the difficulties that the continent has to face (Binswanger-Mkhize, 2008:30). In order to overcome this divide, long-term investment into research, agricultural and science
education institutions, is required. Binswanger-Mkhize (2008:30) believes that it could take more than two decades before this is accomplished. Furthermore, Binswanger-Mkhize (2008:29) found that Food, Agricultural and Natural Resources Statistics (FANRS) were not very well developed in Africa. This has implications for agricultural and rural development procedures, as they depend heavily on quality data for the monitoring and evaluation of such strategies. The available databases, that are required to calculate the MDGs progress in decreasing hunger, were thus deemed inadequate.

Vordzorgbe (2007:4) criticised the national information systems in Africa. According to him, these systems are not equipped towards producing, examining and distributing disaster related information. Without such crucial information, the population would not be able to anticipate and prepare for the pending disasters that could affect their food security. Vordzorgbe (2007:4) also points to the population’s inadequacy to access such information, and their restricted ability to analyse the available data.

Development programmes and projects cannot be successful without the use of appropriate technology. Much evidence of the failure of projects, because of unsuitable or poor quality technology, exists in sub-Saharan Africa (Ite, 2003). This clearly points to the crucial role of science and technology in the process of development. It is thus highly beneficial for a country to invest in technological advancement, so that they may enhance development and work towards eliminating food insecurity.

e) Social factors

The statement that “... a capable state requires an engaged society that holds governments accountable” (The World Bank, quoted in Binswanger-Mkhize, 2008:37), emphasises the importance of society’s role in influencing and regulating a government’s involvement in the development process. There are multiple social aspects that influence development, as well as food security, but unfortunately not all of them can be examined in this review. The most frequently occurring aspects have therefore been selected for further examination. It is crucial to note though, that the exclusion of an element from the discussion does not necessarily indicate that it is
any less important than those that are presented. The following diagramme lists, but is not limited to, the social elements that influence a population’s food security.

**Figure 15.** Examples of the social elements that affect food security.

![Diagramme of social elements affecting food security](image)

Source: Adapted from Young, 1997.

Differences in the amount of food consumed by various population groups within a country are commonplace. Women, infants and young children, the elderly and ethnic or religious minorities are generally the population groups that receive the least amount of food and they are therefore the most vulnerable to experiencing hunger. Automatically, these groups would become the most affected during a food crisis (Young, 1997:30-34).

Ambler et al. (quoted in Binswanger-Mkhize, 2008:37), state that poor women and girls (like men in the same predicament) do not have the assets and earnings needed to combat poverty. They do, however, have the added disadvantage of being susceptible to gender-based conditions that continue to confine them to poverty. In comparison to men, women may therefore experience:

- less advantages and protection under customary or statutory laws;
- a reduced power in decision making and in controlling financial wealth;
- gender-based violence, social isolation and larger time constraints.

Gender inequality in culture and tradition significantly influence a population's food security. For example, in some cultures women may be prevented from consuming...
certain foodstuffs that are only to be enjoyed by men (e.g. protein rich foods like meat and eggs), thereby compromising their nutritional intake. Even though women are the main food producers in subsistence farming, they are often simultaneously engaged in income generating activities away from the farm, caring for children and the elderly and attending to household chores (Saad, 1999:2). Hence, they are not always able to devote the maximum amount of time or energy into farming. Women are also most likely to experience malnutrition during pregnancy, as well as other complications, as a result of their engagement in labour intensive activities (e.g. fetching water), thereby further depleting them of the strength required to source or produce food. Women-headed households have great difficulty in satisfying household food security solely through their own food production (Saad, 1999:2). Moreover, much inequality exists in women’s access to health care and education, thereby increasing their overall vulnerability (Ambler, et al. quoted in Binswanger-Mkhize, 2008:39). The alteration of customary gender behaviour and roles in society is problematic and far from an ideal state in developing countries (Ambler, et al. quoted in Binswanger-Mkhize, 2008:39). Importantly though, women play a significant role in securing food in Africa because they constitute the majority of farmers. Hence, agricultural efficiency and rural income can be regulated by enhancing women’s productivity (Saad, 1999:2).

Many governments have designed strategies aimed at improving the conditions of poor women. Unfortunately, these plans have been unsuccessful in achieving its’ goals, because they have either treated women’s issues as an additional constituent of, or incorporated their burdens into, the development programme. Neither of these approaches assists women in solving the problems that they face in everyday life or in producing sufficient food for use in the household as well as the marketplace (Saad, 1999:2). Equal access to social, legal and other applicable resources need to be identified and provided by policy makers, in order to secure food availability and access at a household level (Saad, 1999:2-3).

The traditional land-ownership systems, which have generally administered secure inheritance privileges, have been strained in many African regions by population growth and rising market entrance (World Bank and the Economic Commission for Africa, cited in Binswanger-Mkhize, 2008:39). Often, traditional systems were
unsuccessful in providing secure property ownership rights to women and in managing conflicts that arise when pastures are enclosed or when immigrants need habitation. The development of these systems has thus received much attention in Africa in recent times, and it is has also emerged as a concern for aid assistance (Binswanger-Mkhize, 2008:39).

Research has shown that the majority of countries that contain a variety of languages (i.e. linguistically heterogeneous) possess very low per capita gross national products, while countries that contain only one language (i.e. linguistically homogeneous) have somewhat higher gross national products (Banks and Textor, cited in The International Development Research Centre (IDRC), 1997). One explanation for this is that language diversity reduces economic development through, for example, reducing competency and limiting the distribution of new techniques (Pool, quoted in IDRC, 1997). Hence, the participation in socio-economic development is restricted to the minority upper-classes of a society in many African countries, because of their ability to utilise the official languages. However, another researcher found that a correlation between linguistic heterogeneity and low economic development could not be established (Fishman, cited in IDRC, 1997). It was clearly ascertained though, that illiteracy is intimately connected to poverty. Countries where illiteracy has been virtually eradicated show higher per capita incomes, than those with greater illiteracy (UN Educational, Scientific and Cultural Organization (UNESCO), cited in IDRC, 1997). Moreover, the education systems in Africa were found to be tarnished with, amongst other things, financial and pedagogical troubles. Illiteracy, and its associated lack of education, presents a number of difficulties because it can obstruct people’s food security by hampering their earning potential (Marah, 2006:32-37).

Other factors embedded within a social dimension, that may affect the food security of households, include:

- social traditions (e.g. weddings, funerals and dowries) that demand the spending of money or assets,
- adversities brought about by the theft and vandalism of possessions, and
- activities such as gambling and drug abuse, that simply wastes the resources that one might have.
The physical inability of only one member of a household, caused by an accident, pregnancy, child-birth, handicap or prolonged illness (e.g. HIV/AIDS or tuberculosis), can result in decreased earnings and in turn, decreased food acquisition (Young, 1997:126).

Within a period of ten years, Southern Africa progressed from losing one-third of its working population, as a result of Aids-related deaths, to two-thirds. Migration from urban to rural areas will probably occur because of the shortages of agricultural labour. However, HIV/AIDS is anticipated to steadily decrease the capital (i.e. land, cattle, savings and other draught animals) of rural households or communities. It is predicted, that within the next decade, 20 million AIDS orphans could be found in Africa (Binswanger-Mkhize, 2008:39 & 40). The orphan crisis introduces its own set of difficulties. For example, it was found that households that fostered one or more orphans suffered more food insecurity and hunger than those that had no, or only one, fostered orphans. Binswanger-Mkhize (2008:40) believes that agricultural, food and nutrition interventions are unlikely to exert a strong resistance against the spread of HIV/AIDS, or against death resulting from the disease. Nevertheless, he does acknowledge that agricultural, food and nutrition interventions are most probably crucial to lessening HIV/AIDS’ impact on households.

Food security may vary from region to region as well. Hence, we might find that some countries in the South are better able to cope with their country’s food security than others. Those regions faced with a more intense food crisis are usually politically unstable or economically weak. More severe problems with food insecurity are however found in regions that have unfavourable conditions and contain ethnic or religious minorities. In such cases, the disadvantaged regions will be seen as corresponding to ethnic or religious prejudice (Young, 1997:111-120). Some low-income countries are also experiencing rapid population growth which is pressurising natural resources and threatening future food security. This increase in population and its consequent decrease in available natural resources, can lead to increased competition for land and water amongst ethnic and religious groups, the poor and wealthy, as well as those who own land and those who are dispossessed. Such friction in a society can translate into widening conflicts, as everyone tries to meet their survival needs (Brown, 2004:23-26). One should however, refrain from
stereotyping. Here, reference is made to the fact that not everyone in the South are suffering from hunger. Many people in the South are able to enjoy a very good diet, and likewise one finds many people in the richer West who are experiencing hunger. Such unpredictability illustrates the complex nature of the study of hunger and food security.

Some of the social elements that have been investigated in this literature review, such as the problems related to HIV/AIDS and illiteracy, are complex and require a deeper understanding and committed approach to overcoming their limitations.

f) Economic factors
Although national processes, like urbanisation, should be considered when understanding how a population’s food security is affected, the importance of understanding the global structures which play a role in “… the geography of food production and distribution” is emphasised (Young, 1997:36). Here, she draws attention to the past economic, political and social context that has moulded, and continues to influence the current ideas about food production, distribution and acquisition. Brown (2004:193) also draws our attention to the global nature of food security. He recognises that the world grain market exerts an influence on the entire population through grain price fluctuations.

Interestingly, food prices have actually been decreasing since the 1950s. During the ‘green revolution’ that commenced in the mid-1960s, farmers in developing countries were having good yields and planting improved varieties of cereals, food prices were decreasing and poverty was being reduced. According to the International Monetary Fund (IMF) Primary Commodity Prices though, cited in Wiggins and Levy (2008), food prices have been rising steadily from the beginning of the 2000s, and especially since 2006. For example, a ton of wheat increased in price from US$ 105 (January 2000) to US$ 167 (January 2006) to US$ 481 (March 2008). Future predictions indicate that prices will continue to rise over the next ten years, because of changes in the supply and demand chain. The cost of fertiliser, transport and machine operations will also rise as a result of rising oil prices.
For those in the richer North, such a change in the cost of food can be managed by reducing the amount of money spent on luxury or non-essential items, or by obtaining support from the state. For those living on the breadline in the poorer developing countries of the South (without any welfare support from the state) such global change in the availability and pricing of foodstuffs clearly spells disaster, as these people usually have no support structures on which to depend. High food prices affect the poor directly, as producers and consumers, and indirectly, via their countries’ economies. They are most likely to reduce their food intake as prices continue to rise. Even though their calorie intake might not be reduced, the quality of their diets may be affected. The poor may purchase cheap, high calorie foods, instead of foods that are packed with vitamins and proteins, like fish and vegetables.

Actions required to lessen the pressure generated by price increases (e.g. food subsidies), should not be delayed. The WFP requires support for their operations and low-income countries need to be compensated for elevated import bills. Economic growth can promote incomes to offset high food prices, but most importantly, farmers require the correct course of action in order to assist them in producing more food. On the positive side, rising food prices could act as a stimulus for decreased food importation and increased agriculture production, thereby lessening the effects on the poor (Wiggins & Levy, 2008). Clover’s (2003:14) suggestion that Africa’s agricultural
sector should receive more attention and increased funding is essential for enhancing a country’s food production.

According to Clover (2003:14), the World Trade Organization (WTO) requires immediate restructuring so that the provision of assistance can be increased and poor countries can become more engaged in its’ operations. With regards to developing countries, Clover (2003:14) recommends that:

a) trade barriers should be lifted from products that are relatively beneficial,
b) tariffs for processed agricultural products should be decreased, and
c) the partial access to markets should be removed.

It is often found as well, that countries battling with food insecurity, hunger and malnutrition continue to export more food products than what they actually import. Africa is one such region that persists in exporting food even in the light of drought, famine and very evident cases of under nourishment and starvation (Lappé, et al. 1998:9 & 10). The desire to make a profit is generally the driving force behind such activities, with very little consideration for the health and wellbeing of the population. However, those countries that do not have the resources and technology necessary for food production may have to import/export food regularly (Saad, 1999:6).

Saad (1999:6) suggests the following two strategies that can be used to increase food security.

i. Firstly, it is recommended that developing countries, with food shortages, should increase the productivity and output of their export sectors to its’ greatest capacity. In turn, the foreign exchange generated from these exports can be used to import food. This strategy holds that growth in world trade will allow these countries to produce and export goods that will give them the opportunity to purchase fairly large quantities of food from countries that have a food-surplus. Dynamic national food security policies would have to be developed and implemented for this food to reach the population that is suffering from food insecurity though.

ii. Secondly, a strategy which is considered to be more practical by many analysts, proposes that countries with food shortages should re-adjust their development approaches so that their agricultural sectors receive more
investment. These countries should boost their own food production and utilise policies aimed at alleviating food insecurity at the national, provincial and household levels.

The above therefore illustrates the importance of good economic (and other) management in such instances where food import/export has to be carried out, in order for such transactions to benefit the population.

Even though agricultural strategies may have a bearing on matters pertaining to food security, one cannot ignore that the livelihoods of a rural population is often quite diverse, as many rely on a variety of activities for their survival (Young, 1997:78). These people may earn money from employment activities (wages), making and selling traditional arts and crafts, trading, providing a service or they may depend on finances from family members who work in cities or towns. The workforce in Africa is, however, also threatened by the incidence of HIV/AIDS. Financial stability and food security are weakened as the disease claims the lives of the working population (Brown, 2004:19). During times of economic weakness, disaster, unrest or any other situation which hampers peoples earning potential, they will lose their purchasing power and may be forced to succumb to hunger. When water becomes a valuable asset during times of such disaster, the cost of clean water often rises dramatically. If water prices increase concurrently with food prices, then those who are struggling financially will find it difficult to acquire these two basic needs (Young, 1997:116).

g) Effects of food insecurity
The long term effects of a food crisis can manifest itself in many ways. Hunger and its associated malnutrition can cause people to develop other health problems or diseased states, force them to migrate in search of food, or to engage in behaviour that they would not normally display (e.g. theft and prostitution). However, it is also important to note that every incidence of food insecurity has its very own characteristic traits and that no two incidences are generated by, or give rise to, the exact same conditions (Young, 1997).

When examining the concept of hunger, it is becomes important to consider the role that water plays in human (and animal) health. During disasters, like flooding, where the water supply is destroyed or polluted and where sources of sanitation are also
destroyed or disrupted, illness may eventually set in as a result thereof. Such illness can prevent people from physically benefiting from the food which they consume. Hence, in order to avert malnutrition, people need access to clean drinking water and proper sanitation as well (Young, 1997:24). Also, in order to avoid malnutrition, the food that is available or accessible has to be of a good nutrient quality. It is of little use if nutrient deficient foodstuffs are abundantly available, and people are considered to be food secure because of the amount of food that they have access to. The amount of food available only becomes really significant to food security when it contains the vitamins, minerals, proteins or carbohydrates necessary for the good health and activity of an individual.

The above literature review, investigating the subject of food security, presents it as an intricate topic that would require profound analysis in order to understand it fully and place it into perspective. It has become clear that immediate food aid interventions should be harmonised with long-term, carefully planned procedures, through the utilisation of a multi-dimensional approach that encompasses environmental, political, social and economic considerations (Clover, 2003:14). Alam’s (2008) statement that, “How floods affect food security is a complex matter to which there is no straightforward response” summarises what has been discovered in the consulted literature.

2.5. Relief and development

The idea of linking relief, rehabilitation and development began appearing in literature towards the end of the 1980s (Lieser, Padberg, Runge & Schmitz, 2006:2). This viewpoint can be stated as, “Better 'development' can reduce the need for emergency relief; better 'relief' can contribute to development; and better 'rehabilitation' can ease the transition between the two” (The European Union Commission, quoted in Lieser, et al. 2006:2 and Buchanan-Smith & Maxwell, 1994:1).

Buchanan-Smith and Maxwell (1994:1) argued that emergencies appeared to have shifted development into another position and that in some instances emergency food aid has even become customary. This orientation has lead to a great deal of the government’s and/or the institution’s budget being spent on emergency aid. The
following five points have been identified as reasons why relief should be linked with development, namely:

i. There are donor concerns about growing budgets that are spent on emergencies and how the links with development aid can be encouraged.

ii. Emergencies can complicate later development by altering the flow of funds or creating new areas that demand attention but which do not respond appropriately to development requirements.

iii. Rehabilitation has increased in importance, particularly because of the bond between famine and war.

iv. Poor people plan their livelihood strategies according to the risks that they face. Hence, detailed models that pay attention to the diverse and intricate nature of livelihood strategies are required.

v. Positive outcomes can result from linking relief and development. The most optimal model is one that allows relief and development interventions to be performed in agreement with each other. This would provide the poor with livelihoods on which they can depend and effective forms of protection, thereby reducing the frequency and effect of climate shocks and the difficulty of rehabilitation (Buchanan-Smith & Maxwell, 1994:2 & 3).

Davies, cited in Buchanan-Smith and Maxwell (1994:4), noted that in some areas in Africa, the incidence of vulnerability is increasing as a result of coping strategies that are being smothered by expanding poverty. Household vulnerability can be explained according to their ability to take charge of these sudden disturbances that occur. The following diagramme illustrates the possible abilities of a household to manage shocks.
**Figure 17.** Household abilities to manage shocks.

<table>
<thead>
<tr>
<th>i) unaffected by shocks</th>
<th>ii) recover quickly from shocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households can manage shocks in the following ways:</td>
<td></td>
</tr>
<tr>
<td>iii) unable to recover from shocks &amp; continue to decline</td>
<td>iv) benefit from the downfall of others</td>
</tr>
</tbody>
</table>


The opportunity for interventions that link relief and development differs from one region or country to another. For example, NGOs would probably have to lead programmes in countries where the state has a compromised capacity, whereas government-run programmes are more likely found in countries where the state’s capacity is stronger (Buchanan-Smith & Maxwell, 1994:10). Irrespective of the institution that takes responsibility for initiating such programmes, from a developmental point of view, the reasons for connecting relief and development is to establish a means of minimising:

i. the frequency and intensity of shocks, and the

ii. effects that it creates.

This will ultimately result in a decreased demand for emergency relief.

However, in order to diminish the effect of shocks, individuals, households and economies would need to become less affected by the occurrence of shocks and more equipped to recuperate from them when they do occur (Buchanan-Smith & Maxwell, 1994:5 and Christoplos, 2006). The development of farming systems, a variety of income generating activities and the development of health facilities could be used as interventions to reduce the effects of shocks on a population. Moreover, the lessons that are learnt about risk and vulnerability, from a disaster, should be considered in the reconstruction programme (Christoplos, 2006). This is especially important to avoid the any of the same mistakes that may have been made in the past (e.g. constructing buildings in hazardous locations). Box 1 provides an account of the actions that were taken in Mozambique, when attempting to link relief and development. It highlights the importance of utilising a variety of methods when
assisting a population to restore their livelihoods. In addition, providing the affected population with the opportunity (in the form of finances) to decide what they require in order to recover from the crisis, appears to function effectively.

**Box 1. Linking relief and development in Mozambique**

Following the 1992 peace accord, the focus of most aid programmes in Mozambique shifted from emergency relief to rehabilitation. Approximately 3 million internally displaced persons and 1.5 million refugees were assisted in returning to their home areas. Although many households rapidly restarted crop production, they remained vulnerable because basic services had not been rebuilt. Distributing cash was more appropriate in some cases than distributing a standard bundle of food, seeds, tools and selected household items. Cash allowances gave the returnees the ability to choose what they needed most and helped to revitalize the local economy.


The following two conditions need to be met in order for relief and development to function together effectively. Firstly, relief should not thwart development. Relief strategies that do not hinder development include:

i. providing relief early in the disaster,
ii. providing financial aid to governments,
iii. utilising distribution procedures that are suitable to the local culture and society,
iv. being sensitive to gender issues,
v. improving the local capacity (Buchanan-Smith & Maxwell, 1994:6), and

Secondly, relief operations should assist development in the best possible way. The following examples illustrate how relief can contribute to development.

i. Instead of receiving free handouts, people can be employed in programmes that repair structures or plant trees. In exchange for the work that they complete, they can either be paid in cash or with food (i.e. food-for-work programmes) (Buchanan-Smith & Maxwell, 1994:7).
ii. By utilising emergency relief to introduce or enhance infrastructure on all levels, that can continue to be useful after the emergency has passed (e.g. by building health centres as part of emergency operations) and that will serve to decrease similar future crises (Buchanan-Smith & Maxwell, 1994:7 and UNDP, 1998:3).

2.6. Conclusion to literature review

Of note, is Boko et al’s (2007:457) opinion that an understanding of the influence of climate on food security in Africa has not been fully attained as yet and that this serves to further complicate the subject under discussion. The above overview does however indicate that the subjects of hunger, food security, climate change and flooding cannot be easily attributed to one causal factor. Instead, these are complex issues with many facets. The recurring theme in the consulted literature points to the importance of socio-economic, political, and other aspects, in the understanding of weather phenomena and food security. Climate extremes, like flooding, are considered to only play a small role in creating a more insecure environment to food access. In spite of this fact, the great losses that occur in the agricultural sector, as a result of climate shocks, not only restrict a population’s ability to prevent malnutrition, but it also reduces their income. Hence, without finances to pay for various services, they may find that their access to education and health care, for example, is hampered. In turn, this occurrence with negatively influence their livelihoods, plunging them into a deeper cycle of poverty. Understandably, both flooding and food security in Africa have emerged as topics that would benefit from further in-depth, independent study.

Numerous theories, recommendations and explanations, dealing with human security or basic needs issues, can be found in past and current literature. A theme that has gained priority in recent years is that of ‘risk’ and ‘risk society’. Authors and scholars, like Shah (2008:117), recognised that many developing societies encounter a wide variety of risks on a daily basis and that important implications are contained in the manner in which they perceive these risks. It becomes difficult to establish and actualise risk reduction strategies when the society does not understand the type and degree of risk at play. Without clarity about where catastrophe risk belongs in their
categorisation of risks, it is not easy for them to address the risk. For that reason, the paramount prerequisite for a developing society is the fulfilment of required risk reduction strategies so that catastrophe risk, and its relationship to the other natural or man-made risks, can be understood.

Many experts propose the use of adaptation strategies as a solution to coping with the changing weather. However, Boko et al. (2007:435) found that even though African farmers have implemented various adaptation strategies to cope with the current changes in climate, it may not be sufficient to cope with the changes that may arise in the future. Brown (2004:194) suggests that we pay special attention to, and adopt new policies which bear the earth’s natural boundaries in mind. Likewise, Boko et al. (2007:457) recommends that improved methods and models are introduced to increase our understanding of these “multiple stressors”. The other challenge is that the growth and development of developing countries may be delayed because of the rapid rate at which climate change is occurring (Stern, 2007:99 and UNDP, 2007:1). It therefore becomes crucial that those involved in development-related activities, should take this process into account in their decision making and planning procedures. The proposed relief-development relationship provides some useful suggestions for accomplishing some of these inter-related goals. Like any other intervention or strategy, linking relief with development requires careful planning and optimal management in order to be successful.

Another short-coming in the attempt to cope with the changing climate is that local climate disasters often go unreported, or they are not given much attention (UNDP, 2007:76). This can eventually lead to gaps in the body of knowledge, and the full effect of what is happening world-wide, with regards to extreme weather events, may therefore be understated. With regards to the media, it has been importantly pointed out that even though the local press may not report on extreme weather events, it does not indicate that it did not occur (ECJRC, 2007:3 & 4). The press may often focus on other crises, such as armed conflict, and may choose to overlook the weather events that are occurring in their country. It is therefore critical that one does not solely utilise the media as a source of information when attempting to gather an understanding of a country’s status or position in the global system of climate change.
A positive finding from the literature review indicates that it may be possible, with additional human resources, to establish an African Flood Alert System within four to five years. This system for the continent of Africa can be set up by using the techniques and knowledge acquired from the development of the European Flood Alert System. The WFP, in consultation with the ECJRC, suggests a high need for a flood warning system in Africa (ECJRC, 2007:12). The possibility of receiving early flood warnings would provide many people with the opportunity to prepare for the disaster, or avert it completely, thereby lessening some of the devastating impacts of these events.

Authors, like Young (1997:36) and Webster (1990:6), draw our attention to the benefit of considering the history of a society when studying it. Considering this viewpoint, one would need to carry out a more thorough investigation of the past, current and future economic, political and social causes and consequences, in order to properly understand the relationship between flooding and food security. Unfortunately, the breadth of this research does not allow for such an in depth analysis. Instead, it is most suited as an introduction to further research into flooding and its associated food security problems. The research will, however, compare the food security issues of the flooding that affected Mozambique and Zambia in 2000 and 2007. This comparison allows one to compare, albeit on a small scale, the past and present actions, strategies and policies that were employed by various actors in the flood management process.

The literature review has been highly instrumental in deepening the understanding of, and approach to, climate change, flooding, food security and development. It set the backdrop for the research methodology as it prompted an investigation of the underlying humanistic principles that are related to food security in times of disaster. This people-centred approach has therefore become the main setting for the research. Hence, the research adopted a methodology that was chiefly qualitative in nature, while employing a nominal amount of quantitative aspects. Through the examination of the factors that affect flooding (e.g. climate change and man’s interference in the natural world) and food security (e.g. development and the constraints to food security), fresh insight was fostered for addressing the sub-problems of the research. This newfound perception and knowledge increased
awareness and observation for pertinent events, actions and outcomes of the 2000 and 2007 flooding in Mozambique and Zambia.

A multitude of views, opinions and theories can be found on subject matter dealing with development issues. However, Adjibolosoo (1999:58) criticises the orthodox economic growth and development theories for having misguided the economists and authorities of developing countries. He holds the opinion that developing countries may have been subjected to having to focus on unimportant arguments and concepts that are likely to vary (Adjibolosoo, 1999:58). This distraction has subsequently caused them to fail to notice or consider programmes and policies that have a bearing on advancement, productivity and economic development. If this is indeed the case, then many developing countries have suffered at the hand of the conventional wisdom emanated from these theories, rather than actually being catapulted into growth and development. If one does cast a quick glimpse at what has been achieved in terms of development, then the poverty stricken masses’ outcries certainly depicts a scenario that questions the success of the orthodox theory.

The problems of climate change, flooding, food security and their relationship with development need to be addressed with enormous urgency. In a discussion of climate change and sustainable development, the close relationship between these two concepts are suggested, when Banuri and Opschoor (2007:7) state that “… any successful solution to the climate problem will have to come from within the development process…”. One of the many motivating factors to address this matter immediately is the prediction that by the year 2100, an estimated 45 million people in sub-Saharan Africa alone could be living on less than US$ 2 a day (Stern, 2007:109). This is a rather shocking forecast. With the steadily climbing cost of living and the ever-increasing food prices, the next century would most definitely see a decrease in the value of what US$ 1 can purchase. This prediction clearly indicates serious troubles for many people in developing countries and the only way to prevent it is to actually tackle the problem now, before it becomes too late.
CHAPTER 3: RESEARCH OBJECTIVES AND METHODOLOGY

The set of process guidelines, which can be applied to any research project, has been followed to secure the successful completion of this research. The main reason for following these guidelines was to ensure that the research was properly executed and that its goals were accomplished. Figure 18 provides a simplified illustration of the stages that should be followed when undertaking research.

**Figure 18.** Steps in the research process.

![Diagram of research process]


The research objectives were formulated in the very early stages of the research process, from the problem statement and questions. In any kind of research, it is crucial that the topic is narrowed down to specific research questions and objectives, because a topic on its own is far too broad from which to conduct a study (Neuman, 1997:10 & 11). Subsequently, these research objectives have laid the platform for the research methodology. The research methodology is basically a plan of how the research will be executed (Neuman, 1997:11). This stage is also very important at the beginning of any research, because it delineates the procedures and tools that what will be used to address the objectives and reach a relevant conclusion.

The research objectives and methodology were inspired significantly by the literature review and particularly the required holistic understanding of environmental (e.g.
climate and extreme weather), social (e.g. population and community), political (e.g. government and non-government institutions) and economic (e.g. financial) aspects influencing food security, as well as development.

3.1. Research objectives

The identified research problem can be stated as ‘Food security in Africa is being affected due to direct and indirect threats associated with recurring flooding events’. Directed by this problem statement, three fundamental objectives emerged, namely:

i. The principle objective of the research was to develop an understanding of the impact of flooding on food security. In order to establish how flooding influences the food security of a population, the study had to take a holistic stance and include various principles related to overall human security. As discovered in the literature review, both flooding and food security are tremendously influenced by social, political and economic factors. These factors include, but are not limited to, gender, income generating activities, established policies, and political stability/instability. Hence, apart from examining the environmental causes and consequences of the Mozambican and Zambian 2000 and 2007 flooding, it was crucial to explore the populations’ experience of the event and the role that the government (and other institutions) played in providing assistance.

ii. Although an understanding of the effects and consequences during a disaster are important, it is also imperative to consider and evaluate the events and actions that occurred before, and after disaster, struck. This approach was useful in determining whether the countries and their populations were equipped to, and capable of, dealing with a food crisis that was brought about by flooding. Particular attention was paid to the methods and actions that were used to avoid a food shortage and to secure or improve the Mozambican and Zambian populations’ access to food. This included an examination of the various types of aid provided, the interventions that enhanced agricultural activity and the approaches utilised to promote swift livelihood recovery, to name a few. An investigation into the amount of aid that the countries received
assisted in determining the extent of the crises, while a comparison of the 2000 flooding with the 2007 flooding helped to determine whether these countries utilised strategies and policies that were founded on their experience of the earlier flooding event. The following diagramme lists a few of these necessary considerations, but many more can be found in the field of disaster preparedness and response.

**Figure 19.** Examples of procedures and actions that can be taken before and after flooding.

<table>
<thead>
<tr>
<th>Strategies employed before a flood disaster</th>
<th>Strategies employed after a flood disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>• issuance of early warnings</td>
<td>• provision of humanitarian assistance</td>
</tr>
<tr>
<td>• protection of a population’s food supply</td>
<td>• introduction of risk reduction procedures</td>
</tr>
<tr>
<td>• flood-proofing important buildings</td>
<td>• population resettlement to safer areas</td>
</tr>
</tbody>
</table>

Sources: Alam, 2008 and Associated Programme on Flood Management (APFM), 2006.

iii. The purpose of this research was not solely aimed at understanding what led to, and resulted from, the Mozambican and Zambian flooding. It was also encouraged by a desire to understand and develop a set of recommendations that could be used as a framework in efforts to counter the detrimental effects of subsequent periods of flooding on food security. The significance of being equipped with knowledge and strategies that are useful in protecting a population’s safety and wellbeing are especially relevant in an era when climate change is predicted to increase the frequency and intensity of extreme weather events, like flooding. Just as the complexities of climate change and extreme weather events require thorough investigation by experts and scholars in a variety of scientific disciplines, so too does people’s possible coping and adaptation methods require deliberation. Above all, by reducing people’s vulnerability to risks and hazards, the process of development will be allowed to proceed with minimal restriction.
With a clear understanding of the objectives of the research, it was possible to formulate a plan of action (or methodology) that was most suited to the problem being investigated. Besides befitting the problem at hand, the methodology allowed the research to be executed in a manner that would be beneficial to adding to the developmental body of knowledge.

3.2. Justification of methodology

The executed research is a descriptive, comparative case study of two East African countries, namely Mozambique and Zambia that were affected by flooding in 2000 and 2007. A process of description was utilised to present an extensive discussion of the relationship between flooding and the affected population’s food security, within a developmental context.

**Figure 20. Aims of descriptive research.**

<table>
<thead>
<tr>
<th>Aims of Descriptive Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) describe a relationship, process or system</td>
</tr>
<tr>
<td>ii) provide a discussion or numerical account</td>
</tr>
<tr>
<td>iii) supply background or contextual information</td>
</tr>
<tr>
<td>iv) source information to encourage new explanations</td>
</tr>
<tr>
<td>v) explain stages, series or procedures</td>
</tr>
<tr>
<td>vi) present a precise group profile</td>
</tr>
<tr>
<td>vii) report on information that opposes earlier beliefs about a subject</td>
</tr>
<tr>
<td>viii) categorise or classify</td>
</tr>
</tbody>
</table>


Descriptive research is often used in scholarly journals or towards making policy decisions (Neuman, 1997:20), thus this approach is most appropriate for the topic under investigation. Furthermore, the literature review revealed the importance of understanding the hazards and risks that society face, from a perspective that takes into account the social, political and economic elements, influences and/or vulnerabilities. For example, the literature review highlighted aspects, like gender,
infrastructure and health, which need to be kept in mind for the research and the methodology that is used. For this reason, it was not enough to only address questions concerned with ‘why’ and ‘what’. Instead, ‘how’ and ‘who’ questions emerged as even more relevant in descriptive research.

Hence, in addition to addressing:

i. ‘What’ questions (e.g. What caused the flooding in Mozambique and Zambia?)

and

ii. ‘Why’ questions (e.g. Why did the populations have food shortages?)

The following question types most often used in descriptive research had to be dealt with as well, namely:

iii. ‘How’ questions (e.g. How did the flooding affecting food security? How did the government react? How was the food crisis addressed?) and

iv. ‘Who’ questions (e.g. Who was affected by the flooding? Who provided aid to the population? Who suffered most from food insecurity?).

The descriptive process broadens the range of research, which is necessary for the understanding of issues associated with development. ‘Who’ questions stimulate an investigation into the humanistic perspective which ultimately brings the experience of the people affected and involved, to the fore. Especially in the field of development, it is no longer acceptable to merely address the physical or impersonal causes and consequences at play in society. Rather, the intricate details of the subjective elements that contribute to, and shape the human being’s whole experience of a social event gains importance. A large amount of social research is descriptive and it is possible to use nearly all the methods of data collection (e.g. surveys, content analysis and historical-comparative research). A descriptive research approach therefore presented an opportunity to investigate the most pertinent questions related to the influence of flooding on food security.

A case study comparative research design was selected for this investigation, because this type of research is chiefly concentrated on comparing specific societies or cultural groups (Neuman, 1997:404). For example, a typical question addressed in this type of study is: ‘How was the food security of the populations in Mozambique and Zambia affected by flooding?’ Such a comparison is useful to examine the
similarities and differences of a small number of cases. By comparing the course of events, consequences and applied interventions, it assisted in drawing attention to the differences and similarities between Mozambique and Zambia’s experience of the 2000 and 2007 flooding’s impact on food security in the countries. The most beneficial aspect of comparative research is perhaps founded in the belief that it assists a researcher to improve the quality of research (Neuman, 1997:402). Unfortunately though, this type of research can be more challenging and time consuming than other types of research.

In addition to the descriptive, comparative case study approach, this research has also been influenced by a critical mode of inquiry. This mode of inquiry seeks to:

i. clarify false or misleading impressions of reality,
ii. describe the foundations of the existing state,
iii. explain how change can be brought about, and
iv. provide an idea of anticipated circumstances or conditions (Neuman, 1997: 77).

Basically, critical researchers aim to critique and change associations in the social world. This is achieved by disclosing implicit origins of social relations and through the process of strengthening the disempowered. As Neuman (1997:74) states, “The purpose of critical research is to change the world”. Even though this may appear as a rather ambitious endeavour, it is essentially what the process of development is all about. Development strives to, amongst other things, bring about positive change, uplift societies and make the voices of the distressed heard (Human Development Foundation, 2005). Critical researchers are generally discontented with a situation and are on the prowl for an improved state of affairs. As a means to reaching this goal, critical researchers examine various societies or the history of societies. This procedure assists in uncovering other methods with which to mould the social world, and it also assists in bringing about an improved understanding of the process of change (Neuman, 1997:75). Research rooted in the critical science approach is fundamentally action orientated, in the same manner as the discipline of development pursues betterment, advancement, security and sustainability. As a result, this type of mode of inquiry is often adopted by social movements, political organisations or action groups (Neuman, 1997:80).
A mixed research design (i.e. qualitative and quantitative research methods) was used in this study, so that the extent of the research could be maximised and the broadest understanding of the impact of flooding on food security could be attained. Essentially, a qualitative style was mainly used in this research. This becomes obvious in the fact that only a few cases were studied, events and processes were the focus of attention, and the data was expressed as words (Neuman, 1997:7 & 14). Data expressed in the form of numbers (e.g. percentages) is presented as well, thereby adding the quantitative dimension to the research (Neuman, 1997:7).

The research methodology employed in this research presented an opportunity for an interesting, in-depth study of the influence of flooding on food security in Mozambique and Zambia.

3.3. Population

The two countries in East Africa (with the highest number of people affected by the 2000 and 2007 flooding) selected for investigation are:

- Mozambique, with 4 500 000 people affected (2000 flooding event) and,
- Zambia, with 1 553 531 people affected (2007 flooding event).

Both countries were, however, affected by both the 2000 and 2007 flooding events. More detailed background information relating to these two countries, are presented in the country profiles in chapter 4. This serves to introduce the countries under investigation, so that the context in which the research has taken place can be better understood.
3.4. Sampling procedure

Using the purposive sampling technique, a sample for study was collected from the Emergency Events Database (EM-DAT) (2008). Firstly, the African countries affected by flooding in 2000 and 2007 were identified. Then, focusing on East Africa, one country with the highest number of people affected by the 2000 flooding and another country with the highest number of people affected by the 2007 flooding, was selected.

It was appropriate to utilise the purposive sampling technique in this instance, because the research was aimed at an in-depth investigation of very specific cases.
EM-DAT’s (2008) statistics revealed that:

- Mozambique had the largest flood-affected population in 2000 with 4,500,000 persons, while
- Zambia had the largest flood-affected population in 2007, with 1,553,531 persons.

Both Mozambique and Zambia were affected by less severe flooding in 2007 and 2000, respectively.

3.5. Nature of the data

The data has been sourced from existing statistics. In other words, it has been gathered from previously collected information (Neuman, 1997:32). This includes a variety of written works, such as government and international agencies’ documents and reports, scholarly journals, media articles and statistical records.

The scope of the cases under investigation (namely, two countries), required that data was sourced from large organisations (e.g. UN). It would not have been possible to execute the research successfully using data from sources such as surveys, for example. Existing statistics are especially useful when investigating events or processes that occurred over a period of time or when comparing different nations (Neuman, 1997:282). Hence, it was most suitable to utilise existing statistics in this research, because:

i. the influence of flooding on food security as it occurred during the years 2000 and 2007 were examined, and because
ii. two countries were selected for a comparison of these events.

The comparison of Mozambique and Zambia provides an opportunity to identify, as well as compare, how each country was affected by the flooding and addressed the seven dimensions of human security (as well as the environmental, social, political/institutional and economic factors that affect food security). For example, by identifying and comparing the strategies used in 2000 and 2007 to address the populations’ basic needs, restore agriculture and promote health and wellbeing, it
can be determined whether or not these countries were progressing in their approaches to relief and development, and whether or not they were actually working towards sustainable development. Further benefits of collecting existing statistics included allowing one investigator to gather the data, without incurring extra costs or time.

Despite its benefits, a large number of disadvantages arose from utilising existing statistics. For example:

i. Not all the information sought after was found (e.g. very limited information about the 2000 flooding in Zambia was available).

ii. Errors were found in some of the data (e.g. Indonesia was included as a northern African country in EM-DAT’s database).

iii. Data was often omitted (e.g. EM-DAT’s database did not always list all the areas that were affected by the flooding in Mozambique and Zambia).

iv. The collected data (especially data presented as numbers) had to be cross-checked with other sources to ensure that it was correctly recorded. This was often a time-consuming process.

3.6. Data collection and analysis

Various sources have been used to collect data, but online databases have been used as the primary data source. The internet allowed access to the publications and databases of a variety of organisations and institutions (e.g. UN agencies like FAO and research centres like Tyndall). Another benefit of utilising the internet as a resource was that the most recent literature or reports are often published there first. This was especially beneficial when trying to gather data for the 2007 flood event. Difficulties were encountered when trying to access the local libraries though. The printed material was mostly available in the official language (i.e. Norwegian) and often the sought after literature was only found in other parts of the country. Hence, in order to overcome this barrier, some literature had to be purchased from distributors in the United Kingdom.

Professionals at the University of Reading, Dartmouth Flood Observatory, and the Zambia Meteorological Department were contacted to request data and other
information, but they did not respond. The Zambia Meteorological Department has not updated its online database since 2006 and therefore it could not be used as a data source. Mozambique’s INAM does not have an English website, thus it was difficult to source appropriate information. However, it was found that their information was not up to date either and neither did they have information pertaining to the 2000 and 2007 flooding available online. Institutions such as the United Nations (UN), Reuters and EM-DAT were therefore used as the main data sources. Due to the relatively recent nature of the flooding that occurred in Mozambique and Zambia in 2007, there is a great risk that important data and/or information pertaining to this event have not yet been released. This problem was dealt with by regularly searching the internet for new literature. However, this form of data collection has been the most fitting as a past event was investigated and the nature and breadth of the research warranted the use of various institutions’ or experts’ findings. Another drawback encountered, was that literature relating to drought and food security or flooding and health was readily available while information pertaining directly to flooding and food security was found to be very sparse.

The collected data was organised for reanalysis and comparison through note-taking and diagrammatic representation. The notes, diagrammes and charts that were constructed while collecting the data, were utilised to identify and compare differences and similarities in causes, consequences, properties and processes. A flow chart was constructed to outline the order of events, so that an understanding of how they relate to each other could be attained. Descriptive statistical analysis was also utilised to analyse, interpret and represent the data. The non-appearance of information was sought after through comparison, posing questions and being alert for information that was not documented. A conclusion, based mainly on reasoning and arguments (i.e. inference), was formulated from the analysed data.

3.7. Reliability and validity

This investigation required much awareness of issues relating to reliability and validity, because the researcher did not collect the data personally. The collected data was compared and cross-checked and the researcher was constantly alert for
any visible errors, in order to overcome any shortfalls in the reliability and validity of the study.

In order to ensure the reliability of the study, attention was given to:

i. the detection of any changes to the official definitions of various terms. No changes were found and the research can therefore be regarded as adhering to stability reliability.

ii. the equivalence reliability of the research. This was more difficult to determine, because of the scope of the research. It still remains unclear as to whether or not the government, and other institutions, had well ordered statistics, or whether or not other institutions (such as community organisations) provided food aid to the flood victims. This was made even more complex because of the extent of the flooding across the countries concerned.

iii. the absence of data. It could not be determined accurately whether data was collected and then lost later or whether the data had in fact been collected at all. Hence, in order to avoid these problems, data was primarily collected from trusted sources, such as the UN.

In order to ensure the validity of the study, attention was given to:

i. the correspondence of the theoretical definitions to that of the institution from which data was gathered. No problems were encountered here, as the definitions matched very well.

ii. the use of a surrogate or proxy for a construct of interest. This technique was not utilised in the data collection. Only the actual constructs that were of interest were investigated.

iii. the manner in which data was gathered by the institutions from which data was collected. As the researcher had no control over this process, data was only collected from sources that are considered to be professional and reliable. However, some errors did emerge when a comparison of data sets were done.

Although very careful consideration was given to the reliability and validity of the study, the act of collecting data from existing statistics does not allow one to provide absolute guarantees that the study is indeed completely reliable and valid. From the
above, it could be said though, that the study possesses a higher validity than reliability.

3.8. Conclusion to research objectives and methodology

The preceding discussion of the research objectives and methodology presented a brief insight into the importance of proper planning in a research project. Although various literary works covering research methodology were consulted, it was Neuman's (1997) work on qualitative and quantitative research methods that proved to be a considerably useful resource. Amongst other things, this literature assisted in determining and outlining the research design and methodology. Neuman's literature was therefore used as a guide to developing the study, and was therefore consulted regularly throughout the research process.

The three primary objectives that emerged from the problem statement and research questions can be summarised as directed at:

i. understanding the impact of the 2000 and 2007 Mozambican and Zambian flooding on food security in the countries (including, the environmental, socio-economic and political causes and consequences);

ii. establishing and evaluating the events and actions that occurred before and after the above-mentioned event (e.g. issuance of early warnings, rehabilitation of infrastructures and livelihood recovery support); and

iii. developing a collection of recommendations that can be used as a frame of reference to mitigate the detrimental effects of future flooding on food security.

The literature review, especially the humanistic principles of Maslow's hierarchy of needs, the basic needs approach of development thinking, and the positive outlook provided by the idea of sustainable development, inspired the approach to the research. Based on the objectives of the research, a descriptive comparative case study of two countries was selected through purposive sampling. Mozambique and Zambia were found to contain the greatest flood-affected populations in 2000 and 2007 respectively. To set the scene for the research, more details about these countries will be provided in the next chapter. Coupled with a mix of qualitative and quantitative data, the scope of the research was widened and the most appropriate
means for the research was established. Moreover, the critical mode of inquiry significantly influenced the orientation of the research, prompting an investigation into underlying conditions, such as governmental attitudes.

Data was collected from a variety of existing statistics (e.g. EM-DAT’s database) from an array of institutions. Both benefits and disadvantages for this type of data and its’ sources became evident, but the scope of the research deemed it to be the best manner through which to access data. The data was reanalysed and interpreted using various instruments (e.g. charts and diagrams). At the same time, necessary steps were taken to produce the most reliable and valid research possible. The causes, consequences, procedures, characteristics and other information arising from the data analysis were then described and compared, culminating in a conclusion that was founded predominantly on reasoning.
CHAPTER 4: COUNTRY PROFILES

The purposive sampling technique, as outlined in the previous chapter on research methodology, gave rise to Mozambique and Zambia being selected as the two East African countries to be investigated in the research. A general understanding of these countries serves as an important introduction when attempting to delve deeper into the effects of flooding on food security in the country. Accordingly, it is relevant to examine characteristics pertaining to the physical, historical and socio-economic conditions, as well as the food production activities, of Mozambique and Zambia.

As discovered in the literature review, a country’s natural and built environment, political, social and economic status, all influence the manner in which a country is able to deal with hazards and risks. The past events and/or influences have just as much bearing on development and security issues, as what the current situation does. Therefore, it becomes essential to consider the past or historical aspects that have given rise to, or have encouraged, a country’s present standing. With regards to food security in particular, knowledge of a country’s capacity and resources assists in identifying their strengths and weaknesses in addressing this basic need. Hence, the background information of a country becomes a vital source of information.

Country maps, which can also be used when consulting the results section, have been included for reference purposes.

4.1. Comparison of country information

The following tabulated country information provides a concise, comparative overview of Mozambique and Zambia’s demography, geography, climate and socio-economic status. The provided information is by no means conclusive. Only the most noteworthy facts (especially those concerned with food production) have been included in this table.
Table 4. Country information for Mozambique and Zambia.

<table>
<thead>
<tr>
<th>COUNTRY INFORMATION</th>
<th>Mozambique</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>Circa 21 397 000 in 2007. About 70% of the population live below the poverty line. Mozambique’s HIV/AIDS prevalence rate among adults was 16% in 2007.</td>
<td>Circa 11 900 000 in 2007. Roughly 68% of the population lives in poverty. Zambia’s HIV/AIDS prevalence rate among adults was 17% in 2007.</td>
</tr>
<tr>
<td><strong>Economy</strong></td>
<td>GDP was US$ 4.3 billion in 2003. In 2002, agriculture’s contribution to the GDP was 23.5%. GDP per capita in 2003 was US$ 228 per year.</td>
<td>GDP was US$ 4.3 billion in 2002. In 2003, agriculture’s contribution to the GDP was 19.3%. GDP per capita in 2003 was US$ 398 per year.</td>
</tr>
<tr>
<td><strong>Country position</strong></td>
<td>Mozambique lies on the Indian Ocean and borders Tanzania, Zimbabwe, Malawi, Zambia, Swaziland and South Africa.</td>
<td>Zambia is a landlocked country (lying between Zambezi and Congo River basins) and bordering Zimbabwe, Mozambique, the Democratic Republic of Congo, Botswana, Tanzania, Angola, Malawi and Namibia.</td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>Varies from tropical and subtropical (North and central areas) to dry, semi-arid and dry, arid desert (south). The wet season occurs from October to April</td>
<td>The high altitude has resulted in a subtropical climate over most of the country, even though it lies within a tropical region. The wet season occurs between November and April, with December, January and February being the wettest months.</td>
</tr>
<tr>
<td><strong>Precipitation</strong></td>
<td>Rainfall along the coast ranges from 800 to 1000mm and decreases inland with about 400mm at the South African and Zimbabwean borders. 2 000mm are typical in the northern &amp; central regions, while the</td>
<td>The Inter-Tropical Convergence Zone (ITCZ) invites the wet north-easterly/westerly winds, which bring rain. The southern part of Zambia receives the lowest amount of rainfall (750mm) while the northern part</td>
</tr>
<tr>
<td>Major hazards</td>
<td>Epidemics, drought, flood, cyclones, insect infestation, earthquakes, landslides, wildfires &amp; extreme temperatures.</td>
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<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
<td></td>
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<tr>
<td>Water</td>
<td>104 river basins in the country, of which 9 are shared with neighbouring countries. Lake Niassa and Lake Chirua are the main lakes and are both shared with Malawi. Mozambique has more than 1 300 smaller lakes and about 27 dams. Many of the small dams are believed to have been destroyed in the war. The largest hydro-electrical plant in southern Africa on the Cahora Bassa dam provides electricity to several countries in southern Africa. Agriculture is the main water consumer followed by the domestic and industrial sectors. About 1 700 dams in the country. Between 2 000 and 3 000 inexpensive dams and reservoirs have been constructed by farmers or the government in drought relief attempts. Unfortunately, many of these storage structures have been neglected and require repairs. The hydro-electrical plant on the Kariba dam provides Zambia and Zimbabwe with electricity. About 4.8% of Zambia's total land area is covered by wetlands which are important for most of the small-scale farmers.</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>The agricultural sector can be divided into the smallholder and commercial sub-sectors. Approximately 80% of the working population is involved in agriculture, with women comprising roughly 60% of this workforce. The agricultural sector is divided into small-scale, emergent, medium-scale and commercial farmers. About 70% of the labour force depends on the agricultural sector. More than 50% of the rural populations are women who depend on agriculture for income and employment.</td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>About 95% of cultivated land is run by the smallholder sub-sector, producing nearly all the food crops (e.g. cassava, maize and beans). The commercial About 32% of the cultivable land is cultivated with crops like bananas, sugar cane and coffee. Large-scale farmers produce cash crops, while</td>
<td></td>
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<tr>
<td>Sub-sector</td>
<td>Description</td>
<td>Notes</td>
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<tr>
<td>------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>sub-sector</td>
<td>is responsible for main export crops like sugar cane, tea, cotton, tobacco and cashew nuts. Apart from rice and wheat, the country is self-sufficient in grain production.</td>
<td>small-scale farmers focus on food crop production.</td>
</tr>
<tr>
<td>Livestock</td>
<td>Cattle are the main livestock farmed. Goats, sheep, pigs, ducks, chickens and rabbits are also raised.</td>
<td>Cattle are the principal livestock type. Goats, sheep and pigs and poultry are also raised.</td>
</tr>
<tr>
<td>Fishing/Aquaculture</td>
<td>Fishing is an important sector that enriches the population’s diet. Freshwater aquaculture is aimed at the domestic market, while marine aquaculture serves the external markets. The private sector performs formal and informal fish marketing and distribution. More than 95 000 people are directly employed in the fishing sector, and more than 3 to 4 times this amount is employed related areas. The export of products such as seaweed, shrimp, fish and molluscs amounted to around US$ 73 million during 2003.</td>
<td>Fishing is important to the rural economy and forms a regular part of the population’s diet. Fish is mainly used by the domestic market, with bream, Kapenta and catfish as the species most caught. Fish is mainly distributed through retail stores, but also at city and traditional markets. About 21 000 artisanal fishermen are responsible for roughly 90% of the catches while, the remainder is done by about 50 industrial and semi-industrial producers. The total catch in 2000 was 66 671 tons. Bangweulu, Tanganyika, and Mweru lakes, Kafue and Luapula rivers are the major suppliers.</td>
</tr>
</tbody>
</table>

4.2. Background information for Mozambique

Mozambique experienced a long history of Portuguese, British and French involvement in the 1800s. The Portuguese dictator, Antonio Salazar, took back control of Mozambique from the charter companies and introduced a form of apartheid rule in the early 20th century. South Africa eventually became connected economically to the southern part of Mozambique (in the vicinity of Maputo). Some regions lost half of its male population to employment in South Africa. Laws that hindered the development of Mozambique’s domestic manufacturing industry were implemented as well. Mozambique therefore found itself in a situation where it was supplying Portugal with raw materials (especially cotton), instead of developing its own industries (Slaughter, 2000).

In 1964, spearheaded by the Liberation Front of Mozambique (Frelimo), a 10-year long guerrilla struggle broke out against Portuguese rule. At the height of the Cold War, Mozambique was an ally with the Soviet Union and Frelimo attempted to create an economy based on the model used in the Soviet Union. Hence, land was brought under the control and ownership of the state, including the establishment of state controlled agricultural estates. According to Slaughter (2000), in Chokwe (southern Gaza province) hundreds of small scale farmers were moved from their lands to communal villages. At the same time international interest rates were rising, the prices for raw materials were falling, trade sanctions were imposed by neighbouring countries and the consequences of the 17-year long war after independence was still being felt. A combination of these factors therefore resulted in Mozambique’s economic collapse. In the mid-1980s, hospitals, schools and factories were destroyed and/or abandoned and famine was extensive.

Apart from the socio-economic and political troubles within the country, Mozambique also experienced strained relations internationally. South Africa blamed the Mozambican government for safeguarding the African National Congress (ANC). Consequently, South Africa provided military support to the Mozambican opposition forces, Resistencia Nacional Mocambicana (Renamo). Eventually, in 1984, the Nkomati Accord was signed by South Africa and Mozambique, but the war did not end until the General Peace Agreement was signed in 1992. With its economy in
ruins, Mozambique was humbled to make an agreement with the international banks in 1987. The arrangement was that the country would open up its economy to the world market, in exchange for additional credit. A new constitution was developed in 1990, giving rise to a free market economy and the promotion of private property rights (Slaughter, 2000).

This Economic Reform Programme did very little to assist the majority of the population living in poverty. Instead, in order to prove to Western financiers that Mozambique was indeed deserving of credit, the government removed food subsidies, privatised state-owned enterprises, ended its ownership of education, health care and other primary services, and introduced tariffs. When the government aimed exchange rates at reform, the Mozambican currency dropped from 40 metical to a US$ in 1986, to about 10 000 metical in 1996. Yet, Mozambique has been praised by the IMF as a “success story” (Slaughter, 2000).

In 1995, Mozambique was admitted to the Commonwealth of Nations as a full member. This status has very little bearing on the fact that 90% of the Mozambican population live in abject poverty, eking out an existence on less than US$1 per day. Slaughter (2000) found that Mozambique was ranked as the most indebted country in the world, with respect to its income. It was also found to be the most reliant on international aid. In 1997, though, Mozambique became eligible for debt relief under the IMF and the World Bank’s Heavily Indebted Poor Countries (HIPC) initiative.

The above background information of Mozambique, presents the country as one that has had a long history of colonial oppression and the abuse of its natural resources (Slaughter, 2000). The fight for Mozambique’s freedom was not an easy affair either, and even today, the country is still bearing the brunt of it’s difficult past. Mozambique’s history has essential shaped its current standing in the global arena. Thus, in order to fully understand the country’s capacity to deal with extreme weather events and flooding it was mandatory to first learn a little bit about its saga.
Figure 22. Map of Mozambique.

4.3. Food production in Mozambique

Mozambique was ranked as the third poorest country in the world, in the Human Development Index of 2002 (AQUASTAT, 2005a). The country did, however, manage to restore its food production capacity since the end of the civil war in 1992. Unfortunately though, the floods and droughts that occur in Mozambique result in temporary food insecurity. The harvest loss in rain fed agriculture, across different parts of the country, varies between 50% and 75%. The principal irrigated crops, are those cultivated on a lower scale, such as citrus fruits, rice, sugar cane and vegetables (predominantly tomatoes and lettuce). Women are generally not involved in the planning and management of irrigation schemes and traditionally, men grow the high value crops (AQUASTAT, 2005a). These practices point to issues relating to gender and an individual’s position and power in society, which can influence a section of the population’s food security.

The smallholder agricultural sub-sector is characterised by:

- small farming areas (about 1.8 ha each),
- rainfed agriculture, because farmers do not have the financial resources to invest in irrigation systems,
- below standard equipment,
- low inputs, yields and profits.

A small group of emerging commercial farmers can be found in this sub-sector too. They utilise some agricultural inputs and sell their produce at local marketplaces. They are also of the opinion that they need to establish or improve irrigation systems.

The commercial sub-sector is characterised by:

- some technological skills,
- access to credit,
- the utilisation of agricultural inputs,
- access to irrigation,
- production focused on supplying national and export markets, and the agro-industries,
- provision of employment opportunities.
Omar (2005) acknowledged that approximately 50% of the population’s animal protein intake is obtained from fish and fish products. The consumption of marine products is chiefly found in coastal areas and the domestic market for such products is fairly small. Europe, USA, Asia and South Africa are the importers of the high-value species like prawns, while cultured tilapia is marketed and sold locally. The fishing industry constituted roughly 28% of the total foreign exchange earnings in 2003 (Omar, 2005). Rural aquaculture plays a major role in food security and the improvement of the population’s standard of living. Some 2 000 families are involved in seaweed farming and approximately another 3 000 are involved in subsistence fish farming. According to the Aquaculture department, cited in Omar (2005), 1 492 Mozambicans are employed in shrimp farming. Aquaculture in Mozambique also importantly reduces the strain on the naturally occurring supplies, especially shrimp. The country has great potential for further aquaculture development and the Mozambican government has recognised this and plans to establish more fish and shrimp farms.

Cattle are the most important livestock type in Mozambique, but the country has a relatively low cattle population in comparison to its size. Timberlake and Jordao (n.d.) hold that the Mozambican cattle population is probably one of the lowest on the continent. The largest numbers are found south of the Rio Save, because this area is relatively tsetse-free. The numbers are however, not large enough to cause overgrazing. The average herd size is about 10 cattle. Cattle numbers have actually been decreasing over the years because of drought and insecurity in rural areas. Usually, the herd graze on communal pastures during the day and are kept in kraals at night. Cattle provide, amongst other things, meat, milk, and draught power for ploughing, as well as status and a means of gaining and keeping assets (Timberlake & Jordao, n.d.).

Goats and sheep are distributed over the whole country and seem to form the main livestock type in the drier north. Due to their size and reproductive rate, goats are important for smallholders. The number of pigs kept by smallholders increased considerably since Mozambique’s independence. Only one or two pigs are kept by families because of the difficulties to provide them with food. Generally, chickens are kept around the family’s home and are fed on leftovers and chaff. The
commercialisation of smallholder production of poultry was being encouraged. Ducks are kept as well, and are fed on fresh green feed that is gathered locally. The production of rabbits around urban areas, in the smallholder sector, has also been promoted. The feeding of up to 15 rabbits, with grasses and other plants, are easier than when the numbers are larger (Timberlake & Jordao, n.d.).

4.4. Background information for Zambia

Zambia escaped European influence until the mid-19th century, when a host of explorers, traders and missionaries began operating in the country. In 1888, Cecil John Rhodes (representing the commercial and political interests of the British Empire) gained access to mineral rights from the local chiefs. During the same year, it was announced that the British had become the sole dominant power over Northern and Southern Rhodesia (now Zambia and Zimbabwe, respectively). In 1953, Northern and Southern Rhodesia and Nyasaland (now known as Malawi) were merged to form the Federation of Rhodesia and Nyasaland. Ten years later, the federation was dissolved, and Northern Rhodesia was established as the Republic of Zambia in 1964 (U.S. Department of State, 2008).

Kenneth Kaunda’s political party, the United Independence Party (UNIP), was in power from 1964 to 1991. It was Kaunda who fought for independence and who victoriously managed to promote peace between Zambia’s different ethnic groups and regions (U.S. Department of State, 2008). His philosophy of “humanism” disapproved of human exploitation and encouraged unity among people. A one-party state was established in 1972, with the banning of all other political parties.

Zambia faced many difficulties at independence, regardless of it being rich in minerals. The U.S. Department of State (2008) found that the economy was mostly reliant on foreign knowledge and skill, as there were very few educated Zambians with the capacity of managing the government. Zambia’s borders to Rhodesia were closed because of conflict, resulting in major troubles with international transport and the supply of power. Fortunately, the Kariba hydroelectric power plant on the Zambezi River was able to provide sufficient electricity to Zambia. The Chinese
assisted Zambia with building a railroad to the Tanzanian port of Dar es Salaam, thereby reducing Zambia’s reliance on railroads to South Africa and Angola.

Zambia’s main export commodity, copper, experienced a global decline in price in the mid-1970s, urging the country to seek international assistance. However, because of the low copper prices, Zambia found it increasingly problematic to take care of its rising debt. In the late 1970s, civil wars in Mozambique and Angola disrupted transportation routes and produced an influx of refugees to Zambia. South Africa also attacked the ANC’s external headquarters in Lusaka, causing security dilemmas (U.S. Department of State, 2008).

In 1990, nearly two decades after the Kaunda regime was established, the Movement for Multiparty Democracy (MMD) arose in opposition to UNIP’s one-party state. President Kaunda finally ended UNIP’s monopoly in December of the same year. A new constitution was brought into effect in 1991, encouraging a multi-party democracy. In spite of some debt relief, Zambia’s per capita foreign debt was amidst the highest in the world. According to the U.S. Department of State (2008), Zambia’s economy has stabilised, even though poverty threatens the country. Interest rates have decreased, the GDP has grown and trade has increased.

Like Mozambique, Zambia too did not escape the wrath of colonialism. Hence, Zambia’s current delicate socio-economic status carries traces of the international interference that it was once subjected to, which has further ramifications for the country’s ability to deal with disasters. This background information was necessary so that Zambia’s capacity to manage episodes of extreme weather could be understood in the context of the research.
The agricultural sector in Zambia has become more important to the economy since the decline of the mineral sector in the 1980s (de Wit, 2006). From 1995 to 1999, the country’s agricultural export ability increased by approximately US$ 87.4 million. Zambia’s rain-fed farming can be divided into (based on land size) small-scale, emergent, medium-scale and large-scale/commercial farmers. Newly emerging farmers generally combine cash and food crops, while small-scale famers focus on producing food crops and large-scale famers are concerned with cash crops. Many conditions complicate the agricultural sector, which in turn give rise to socio-economic consequences. Farmers in southern Zambia, for example, cannot depend
on rain-fed agriculture because of the variation in rainfall patterns in this area, whereas northern Zambia (which receives high rainfall) has problems with acidic soils which limit crop production. From May to October, when there is no rainfall in the South, irrigation and wetlands need to be utilised. These wetlands and dambos are important for most of the small-scale farmers as they provide opportunities for growing vegetables and grazing livestock during the dry season, hunting small animals, fishing and collecting thatch. The dams and reservoirs constructed by farmers and the government as part of drought relief can be chiefly found in drought prone areas like Lusaka and the Eastern, Central and Southern provinces of the country (AQUASTAT, 2005b).

Even though extreme weather events like floods and droughts have long been exerting a strong negative impact on crop production in Zambia (de Wit, 2006), these weather extremes have been found to have both positive and negative effects. For example, in the honey production industry in the Mufulira district, it was found that during a drought, there are more flowers and thus an increase in honey production. However, if the drought continued for too long, then the bees would move elsewhere in search of water. Flooding, on the other hand, resulted in a decrease in wild flowers and therefore less honey production. A decline in honey production in turn means that honey prices will increase, which of course is welcomed by the honey producers (Riché, 2007:6 & 7). Still though, approximately 80% of the population has a threatened food security status because of drought alone. Hence, in order to reduce poverty and increase food security, Zambia needs to primarily focus on agriculture and irrigation development (AQUASTAT, 2005b).

Zambians consume an almost equal amount of fish and meat. Approximately 65% of the total fish catches are either smoke- or sun-dried, and can therefore be kept for many months. Hence fish and fish products are available throughout the year. Lusaka is the only area that receives a regular supply of fresh fish because it is near to the Kafue River’s fishing areas. In Lusaka, larger sized fish appear to be preferred instead of the smaller varieties. The Zambian government, through the Department of Fisheries, has taken actions to minimise some of the limitations which impede the development of fish production. Development projects can nevertheless, only increase fish supplies to the greatest quantity possible (circa 74 000 tons). Any fish
supplies over that level would have to come from aquaculture or imports, because capture fisheries would otherwise become strained (L’Heureux, 1985).

Meat production in Zambia was estimated to be about 127 000 tons, in 2001 (Encyclopedia of the Nations, n.d.). The livestock sector forms about 35% of the total agricultural activities, but it has also been labeled as a sector that has not been fully utilised. The livestock sector provides draught power, employment and income, status and food products, to name a few. Cattle’s pulling power and manure adds to their worth. An estimated 28% of households keep cattle, which illustrates and emphasises their socio-economic importance. 89% of the total cattle population can be found in Eastern, Western, Southern and Central provinces, while 11% is found in Lusaka, Luapula, Northern and North-western provinces. 80% of the goat population and 83% of the pig population are found in the Southern and Eastern provinces (Sinyangwe & Clinch, 2003:1, 2). Sleeping sickness, carried by the tsetse fly, restrains cattle production in some regions (Encyclopedia of the Nations, n.d.).

4.6. International relations and disaster management units

The following table provides an overview of Mozambique’s and Zambia’s relations with the international community. This table is by no means conclusive. Both Mozambique and Zambia are most likely members of other international institutions, but the table was constructed to provide a general idea of the countries’ affiliations.

Besides membership with various international organisations, there is a number of international aid or humanitarian agencies working in both countries (e.g. the International Red Cross and Red Crescent Movement, Oxfam International, ActionAid, Habitat for Humanity, as well as the various UN agencies, to name a few) (Commonwealth Secretariat, n.d.).
Table 5. List of international relations.

<table>
<thead>
<tr>
<th>INTERNATIONAL RELATIONS</th>
<th>Mozambique</th>
<th>Zambia</th>
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<tbody>
<tr>
<td>United Nations (UN)</td>
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<td>United Nations</td>
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<tr>
<td>International Monetary Fund (IMF)</td>
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<tr>
<td>African Union (AU)</td>
<td>African Union (AU)</td>
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<td>Southern African Development Community (SADC)</td>
<td>Southern African Development Community (SADC)</td>
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<tr>
<td>Community of Portuguese Language Countries</td>
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<tr>
<td>World Trade Organization (WTO)</td>
<td>World Trade Organization (WTO)</td>
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<td>African, Caribbean &amp; Pacific Group of States (ACP)</td>
<td>African, Caribbean &amp; Pacific Group of States (ACP)</td>
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<tr>
<td>Non-Aligned Movement (NAM)</td>
<td>Non-Aligned Movement (NAM)</td>
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<tr>
<td>Indian Ocean Rim Association for Regional Cooperation (IOR-ARC)</td>
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<tr>
<td>Commonwealth of Nations</td>
<td>Commonwealth of Nations</td>
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<tr>
<td>African Development Bank (AfDB)</td>
<td>African Development Bank (AfDB)</td>
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</table>

In addition to international institution membership, such as indicated above, both Mozambique and Zambia have good relations with other nations. For example, Zambia has maintained good ties with China since the Tanzania-Zambia Railway project in the 1970s. According to Zulu, quoted in Xinhua News Agency (2007), the relationship between China and Zambia has been growing. Norway is another country that has established good ties with Zambia, seeking to assist Zambia in reducing poverty. For the 2001 to 2005 period, Norway was focused on assisting Zambia in government, education, transport (i.e. roads) and environment (especially wildlife management) sectors (Norwegian Agency for Development Cooperation (NORAD), 2001:3). Mozambique was found to possess good investor relations with South Africa and Portugal. These are the largest investors in the country, with interests in financial services, metal products, retail, hotels and food processing (Nordás & Pretorius, 2000:14). Hence, it becomes evident that both Mozambique and Zambia seem to be maintaining amicable relations with other nations.

Regarding the countries’ disaster management capacities, Mozambique had established the National Disaster Management Institute (INGC) in 1999, while Zambia had established its Disaster Management and Mitigation Unit (DMMU) in 1994 (DMMU, n.d. and UNDP, 2004). The roles of these units are basically to coordinate and manage the disaster interventions in the countries. The capacities of these institutions will be explored in more detail in Chapter 7, under adaptation and recommendations.

4.7. Conclusion to country profiles

The importance of examining a country’s characteristics can be seen in the following example. In the literature review, it became known from Adjibolosoo (1999:49), that a tropical climate is considered to impede development, while a more temperate climate enhances this process. An investigation of Mozambique and Zambia’s climate, in this chapter on country profiles, revealed that these countries were to some extent lying within a tropical zone. Without background information, it would not have been possible to make such connections between certain theories or ideas. Also, an understanding of the populations’ socio-economic status, for example, assisted in the interpretation and comprehension of the results. Hence, the country
profiles actually serve a greater purpose than merely to present interesting information.

Mozambique and Zambia have emerged as countries that are rich in a variety of natural resources, but which are firmly held in the grip of poverty. The countries’ natural environment (e.g. land and climate), provides favourable conditions for agriculture and fishing, and therefore great possibilities for food production and the production of other commodities that can be traded on global markets. The natural hazards facing both countries threatens their growth and development though, and this is swiftly magnified by the incidence of high vulnerability within their populations. For example, in a study investigating climate change vulnerability in Zambia, it was found that floods, droughts, a shorter rainy season and high temperatures were the main climate hazards affecting livelihoods (Riché, 2007). Irrespective of their dangers, natural hazards are not the only elements that threaten or have threatened the countries under investigation. Man too, has made a significant contribution to the current situation.

An example of human interference in the wellbeing of a country is often portrayed in the legacy of colonialism and oppression. These past conditions are then readily attributed to poverty and the lack of development. Be that as it may, the conditions after independence hardly appear to improve the plight of the indigenous people either. Examples of which can be noted in both Mozambique and Zambia’s political and economic history. As previously revealed, the countries experienced tense relations with their neighbours while becoming embroiled in a web of debt. Government opposition and domestic unrest further compounded an already difficult situation, making it even more difficult to reach the ‘freedoms’ which Sen (1999:3 & 4) identified. Today however, both Mozambique and Zambia enjoy good relations with a variety of international organisations and nations, many of which are supportive of these countries’ development initiatives.

Looking beyond the instances of political and economic peril, Mozambique and Zambia both produce a wide variety of foodstuffs, which offer a range of nutritional, and other, benefits. With the most fitting educational, technical, financial and/or adaptation assistance, these countries can enhance their food sources and provide
their populations with a steady access to food. Alternatively, food availability at a household level alone can be improved. Such success would form an integral part in the realisation of food security, and ultimately overall human security.

The next chapter is notably interesting, as it will present the results of the discoveries made in the research. It will thus become known how the 2000 and 2007 flooding in Mozambique and Zambia affected human security, and specifically food security.
CHAPTER 5: RESULTS

The preceding chapter, exploring Mozambique and Zambia’s demographic traits, presented the two countries as mostly vulnerable (e.g. due to their high incidence of HIV/AIDS and poverty), but also promising (e.g. due to their available natural resources) (AQUASTAT, 2005a and 2005b). The high incidence of poverty and its associated insecurities (i.e. personal, health, food, community, political, economic and environmental insecurities) renders the population extremely vulnerable to climatic hazards and further restricts their freedom for growth and development (Alkire, 2003:14). These poverty stricken households are highly unlikely to recover from natural disasters like flooding, and will probably find themselves slipping into an even deeper poverty trap. It is in this light that the urgency arises for those in authoritative positions (e.g. governments) or those working in the field of development (e.g. international aid agencies), to become more aware of the distinct role that climate change (and specifically in this case, flooding) plays in human security and development.

In support of this view, the research has therefore been formulated in a manner that will present a detailed description of the impact of flooding on food security in two East African countries. Essentially, the investigation wishes to illuminate the fact that food security is influenced by direct and indirect threats that are tied to repeated flooding events. Furthermore, the research also intends to show that food security can be improved or protected amidst such a disaster, through the application of appropriate coping, risk reduction or adaptation strategies. Even though extreme weather events produce large-scale devastation and destruction, there are ways and means for a population to protect themselves and thereby mitigate the immediate and subsequent detrimental effects that arise from a disaster. If individuals, societies, governments, and the international community at large, work together towards a common goal that champions human security for all, optimal development and sustainability, then the social ramifications of a changing climate will gradually fall by the way side.

Constructed from as many as 45 reports, this chapter is primarily concerned with presenting the factual information pertaining to the 2000 and 2007 flooding in
Mozambique and Zambia. Food security emerged in the literature review as a topic that cannot be studied in isolation. All the elements pertaining to other forms of human security and development have to be taken into account, in order to gain a comprehensive understanding of a population’s experience of food security during a catastrophic weather event. For this reason, apart from examining the causes of flooding, it is essential to investigate the consequences related to:

- farming and fishing,
- logistics and transport,
- buildings and infrastructure,
- water and sanitation,
- displacement and resettlement,
- health and disease,
- government and international management and intervention, and
- food aid.

These are just some of the elements that may influence a population’s food security status. An account of what had occurred will be given, using the abovementioned elements as a guide. A more detailed discussion of these results will be dealt with in Chapter 6 under the discussion of results.

5.1. Statistical overview of the 2000 and 2007 flooding events

Statistics collected from the EM-DAT (2008) database, revealed that eastern Africa had the largest number of people affected by the 2000 and 2007 flooding on the African continent. In 2000, 91% of the total affected population was found to be in East Africa. In 2007, approximately 69% of the total numbers affected were once again based in East Africa. East Africa also accounted for 82% of the deaths related to flooding in 2000, and it also had the third highest number of flood-related deaths in 2007, with 210 people reportedly deceased.

Various experts’ and researchers’ concerns that Africa will be severely impacted by climate change and its associated extreme weather events can be illustrated using Mozambique and Zambia as examples in Figure 24. Here, the number of flood
events is displayed graphically, showing that since the new millennium the frequency of disasters have increased considerably. However, it is important to note that, according to Scheuren, le Polain de Waroux, Below, Guha-Sapir, and Ponserre (2008:2), a disaster has to meet at least one of the following criteria in order to be listed in the EM-DAT database. These criteria are that:

- a state of emergency is declared,
- 10 or more people are reportedly killed,
- 100 or more people are reportedly affected, and/or
- an international assistance request is made.

The database does not therefore reflect details of floods that may have occurred, but which did not meet the above-mentioned criteria.

Bearing the above in mind, and being aware that other incidences may not have been recorded, it was found that over a 37 year period the largest number of flooding disasters in Mozambique and Zambia occurred during the last 7 years. This evidence points to the theory that climate change will give rise to an increased number of hydrometeorological disasters.

**Figure 24.** Number of flooding events in Mozambique and Zambia from 1970 – 2007.

![Graph showing number of flooding events in Mozambique and Zambia from 1970 to 2007](image)

From the above graph, it can be deduced that flooding is a weather phenomenon which is occurring more frequently in both of the countries under investigation. If this trend continues in coming years, as various experts and researchers have predicted, it would have a severe long-term impact on the socio-economic status of the countries. It is therefore important to perform research and formulate possible solutions that can be used to cope with these extreme weather events.

The provided percentage table indicates that, in comparison to Zambia, Mozambique has had the largest impacted (i.e. affected and deceased) population for 2000 and 2007 combined, with 76.1%. Even though Zambia’s total impacted population was only roughly a third of Mozambique’s, Zambia was still heavily struck by the disasters. The worst year for Zambia was 2007, with 76.2% of the affected population found here. The total number of people impacted in Mozambique and Zambia (2000 and 2007 combined) is far more than the respective populations of countries such as Norway, Denmark and Finland. Such a population comparison, with the developed North, possibly provides a clue to the magnitude of the 2000 and 2007 flooding in these East African countries.

Table 6. Row-percentage table: Country by impacted population.

<table>
<thead>
<tr>
<th>IMPACTED POPULATION</th>
<th>MOZAMBIQUE</th>
<th>ZAMBIA</th>
<th>TOTAL</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected population 2000</td>
<td>99.7%</td>
<td>0.3%</td>
<td>100%</td>
<td>(4 512 000)</td>
</tr>
<tr>
<td>Affected population 2007</td>
<td>23.8%</td>
<td>76.2%</td>
<td>100%</td>
<td>(2 038 531)</td>
</tr>
<tr>
<td>Deaths 2000</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
<td>(800)</td>
</tr>
<tr>
<td>Deaths 2007</td>
<td>88.9%</td>
<td>11.1%</td>
<td>100%</td>
<td>(45)</td>
</tr>
<tr>
<td>Total</td>
<td>76.1%</td>
<td>23.9%</td>
<td>100%</td>
<td>(6 551 376)</td>
</tr>
</tbody>
</table>

Source: Appendix 1.
5.2. Causes and consequences

The main causes of the 2000 and 2007 flooding in Mozambique and Zambia can be attributed to intense, frequent and/or unpredictable weather events. Unusually heavy rains, storms and cyclones have directly or indirectly affected these countries. The weather conditions in neighbouring states contributed to the flooding, in Mozambique in particular, as the flow and water levels of rivers were increased from rains experienced in these other countries. For example, heavy rains in South Africa and Zimbabwe resulted in a rise in the water levels of the Save and Limpopo Rivers in Mozambique (United Nations Office for the Coordination of Humanitarian Affairs (OCHA) Report 10, 2000).

The trail of destruction that remained, especially in Mozambique, was catastrophic. Homes, schools, roads, hospitals and other infrastructures were destroyed, impacting millions of people and placing a heavy burden on the progress of development in the country.

The illustrative diagramme, presented in figure 25, has been included as a general introduction to the causes and consequences of the 2000 and 2007 flooding in Mozambique and Zambia. The main reason for including the diagramme is to create an easy to understand visual representation of what had occurred and how it had impacted the countries under investigation. The diagramme aims to outline the following, namely the:

i. causes of the catastrophes;
ii. destructive consequences;
iii. responses to the crises, as undertaken by the government, NGOs and the population during the event; and the
iv. actions taken after the disasters.

Due to the universal nature of the diagramme, a more detailed description of the sequence of events and its’ consequences, as it occurred in each country, will be given thereafter.
Figure 25. Outline of the flood events of 2000 and 2007 in Mozambique and Zambia.

CAUSES OF THE FLOODING

| torrential & heavy rains | storms & cyclones |

CONSEQUENCES

| loss of crops, livestock, cultivated land, tools & implements | destruction and damage to roads, bridges & railway lines | destruction & damage to built structures & other infrastructures | loss of homes & displacement | the spread of water-borne diseases, malaria & other ailments |

RESPONSES

| in some instances, no assistance was received &/or provided | relief aid distributed by various institutions | shelter & health care provided by various institutions | people tried to protect themselves & possessions |

ACTIONS TAKEN AFTER THE DISASTER

| in some instances no assistance was received &/or provided | rebuilding of structures & infrastructures | livelihood recovery |

5.2.1. Causes of the 2000 flooding in Mozambique and Zambia

EM-DAT (2008) registered the Mozambican flood of 2000 as starting on 26/01/2000 and ending on 27/03/2000, but the OCHA situation reports indicate that Mozambique was still dealing with water-logging and other problems related to the flooding in July of the same year. The magnitude of these floods reached titanic proportions as people sought refuge in, and had to be rescued from, trees (OCHA Report 13, 2000). The provinces of Maputo, Gaza, Inhambane, Sofala, Manica and Zambezia were severely affected by the flooding. However, Mozambique’s other provinces namely Tete, Nampula, Niassa and Cabo Delgado were also affected by the flooding. Hence, it can be concluded that the whole of Mozambique (in varying degrees in the different provinces) was affected by this disaster.

Figure 26. Map of the Mozambican provinces.

Source: mapsof.net, 2008a.
Torrential and heavy rains caused the water levels of the Limpopo, Incomati, Umbeluzi, Sabie and Save Rivers to rise and flood (OCHA Report 1, 2000). The situation was worsened by cyclone Eline that landed about 100km south-west of Beira on 22/02/2000 (Martin, Capra, van der Heide, Stoneham & Lucas, 2001/2002:26 and OCHA Report 9, 2000). Eline weakened to a tropical depression the next day and was positioned over Zimbabwe (between Harare and Bulawayo). There were concerns that the rivers flowing from the area where the depression was centred would increase the levels of the Limpopo River, causing further flooding (OCHA Report 9, 2000). In addition, heavy rains in South Africa and Zimbabwe led to an increase in the water levels of the Save and Limpopo Rivers. At the end of February, a 2m wave passed through Chokwe (Gaza province), along the Limpopo River (OCHA Reports 10 & 11, 2000).


The Zambian flooding of 2000 was not as severe as the Mozambican flooding in the same year. It began on 03/03/2000 and ended on 04/03/2000 in the region of the Zambezi River Valley (EM-DAT, 2008). Torrential rains caused water levels to rise and four of Kariba Dam’s five floodgates were therefore opened to relieve pressure on the dam, causing severe flooding in the region (British Broadcasting Corporation (BBC), 2000).
5.2.2. Consequences of the 2000 flooding in Mozambique and Zambia

In Mozambique, an estimated 4 500 000 persons were affected, and another 800 lost their lives as a result of the 2000 floods (Appendix 1). Widespread devastation and destruction was experienced, including the loss of cultivated land, as presented in table 7. The National Institute of Disaster Management (INGC) (Mozambique’s governmental institution that is responsible for disaster management) declared a state of emergency in early February 2000 (OCHA Report 2, 2000).

In Zambia, an estimated 12 000 people were affected from the opening of Kariba Dam’s floodgates. Mpofu (2000:30) though, estimates that about 13 000 households were impacted. If this is correct, then the amount of people actually affected exceeds the 12 000 persons that were reported by the BBC (2000). Although the overall destruction was not as severe as Mozambique’s, Zambia did however, also lose
thousands of hectares of cultivated land. In both instances, this loss of land has had tremendous effects on the population’s food security status.

a) *Farming and fishing*
According to the WFP, quoted in Slaughter (2000), Mozambique lost approximately a third of its maize crop and 80% of its cattle. In Manhica, 17 000 ha of cultivated land was flooded. Along the dykes around Xai-Xai, 7 000 ha of cultivated land was affected (OCHA Report 2, 2000). In northern Sofala, some crops were flooded along the river basin in Caia. In Buzi district (Sofala province), it was estimated that 50% of the planted maize, 80% of the rice and 40% of the sorghum were washed away by the floods (OCHA Reports 5 & 6, 2000).

Mozambique’s fishing industry was also severely impacted, with an estimated drop of more than 23 000 tons in the annual fish products. This number includes 22 550 tons for local food supplies, while the balance lost was aimed at the export market. The export loss corresponds to a staggering US$ 36 million. Ninety-eight percent of over 20 000 people that were affected in the fishing sector, were self-employed in artisan fishing (UNDP, 2000:36).

**Table 7.** Estimated crop area lost to flooding in Mozambique (1999/2000).

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>ESTIMATED PLANTED AREA LOST TO FLOODS (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maputo</td>
<td>42 805</td>
</tr>
<tr>
<td>Gaza</td>
<td>59 960</td>
</tr>
<tr>
<td>Inhambane</td>
<td>15 441</td>
</tr>
<tr>
<td>Sofala</td>
<td>33 950</td>
</tr>
<tr>
<td>Manica</td>
<td>12 836</td>
</tr>
<tr>
<td>Tete</td>
<td>536</td>
</tr>
<tr>
<td>Cabo Delgado</td>
<td>11 232</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>176 760</strong></td>
</tr>
</tbody>
</table>

Table 8 provides a breakdown of the crops lost in Zambia, during the 2000 flooding event. The desperation of the people, to save their food supply, is brought to the fore in the report that some people dove into flood waters from canoes, to try and salvage crops. At least one farmer was attacked and injured by a crocodile. Within 9 hours of opening the Kariba Dam’s floodgates thousands of people who grow crops along the Zambezi River lost a year’s supply of food (BBC, 2000).

Table 8. Crops damaged in 2000 flooding in Zambia.

<table>
<thead>
<tr>
<th>CROP TYPE</th>
<th>ESTIMATED CROP AREA DAMAGED BY FLOODS (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>1 100</td>
</tr>
<tr>
<td>Sorghum</td>
<td>100</td>
</tr>
<tr>
<td>Pearl millet</td>
<td>110</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>100</td>
</tr>
<tr>
<td>Rice</td>
<td>60</td>
</tr>
<tr>
<td>Banana</td>
<td>45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 515</strong></td>
</tr>
</tbody>
</table>


b) Logistics and transport

No reports of flood damage to roads in Zambia were found, but in Mozambique, the flood waters cut off many roads (Martin, et al. 2001/2002:31). For example, transport routes between Maputo, Matola, Boane, Namaacha and Ressano Garcia was cut off. Road access from Inhambane province to Gaza and Sofala provinces was also cut (OCHA Reports 3 & 5, 2000). Urgent repairs were therefore required for roads, bridges and railroads.

Xai-Xai airport in Gaza province also experienced flooding. Air transport was however, the only option for rescue and relief in many areas, because of the damage to roads and bridges. Hence, an urgent need for fuel for air missions arose (OCHA Reports 6 & 7, 2000). WFP estimated that 350 to 400 boats were needed for rescue and assistance operations (OCHA Report 13, 2000). The use of boats also presented
its’ limitations though. For example, it took two days to reach some areas in Buzi district (Sofala province) by boat (OCHA Report 6, 2000).

By 01/03/2000, the Mozambican Marine Services were rescuing people along the Save and Limpopo Rivers, and the first aircraft for rescue and relief arrived from South Africa (OCHA Report 11, 2000). As roads and railways were reopened, they were used to deliver aid. Moreover, many people were prevented from earning an income (e.g. selling charcoal and firewood), as outside markets were inaccessible (OCHA Report 28, 2000).

c) Buildings and infrastructure
The only report of damage to buildings and infrastructure in Zambia referred to the flooding of tourist lodges on the lower Zambezi (BBC, 2000). This occurrence had implications for the tourist industry, and consequently, the region’s economy.

Conversely, Mozambique experienced widespread damage to buildings and other important infrastructures. Houses were affected in Maputo and Sofala provinces and Vilankulos, and strong winds and rain destroyed houses in Inhambane. In Moma, another 63 houses were destroyed (OCHA Reports 9 & 24, 2000). The provincial authority’s offices were devastated as well. Medical equipment (e.g. x-ray machines) was damaged in Chokwe hospital (OCHA Report 17, 2000). Chicumbane and Caniçado hospitals and the health posts at Chiluane, Machanga and Chinhaque (Sofala province) were affected. Over 300 schools, across Mozambique, were estimated to have been damaged (USAID, 2000a). The WFP’s warehouse in the Port of Beira was also damaged. Electricity networks were disturbed and about 90% of all operational irrigation schemes were destroyed (Martin, et al. 2001/2002:27).

d) Water and sanitation
There were no reports of disturbances to Zambia’s water and sanitation supply. In Mozambique, on the other hand, it was reported that water and sanitation systems were destroyed and good sources of drinking water were infected (USAID, 2000a). The water treatment plant at Umbeluzi was flooded and the plant in Matola was not operational (OCHA Report 5, 2000). Drinking water problems were encountered in Mabalane, resulting in diarrhoea and malaria (OCHA Report 2, 2000). Matola, in
Maputo province, was left without a water and electricity supply (OCHA Report 3, 2000).

e) Displacement and resettlement

The consulted literature did not provide any details about whether or not the affected Zambian population was displaced. The situation in Mozambique was critical though, and public facilities (e.g. schools and churches) had to be turned into shelters for the displaced. At the start of the disaster, 22 000 displaced were accommodated in 11 sites in Matola and 14 sites in Maputo (OCHA Report 3, 2000). Increasingly more people were displaced, and accommodation shelters were set up throughout the country. Accommodation centres were primarily concerned with acquiring and providing food and non-food aid (e.g. tents, blankets, plastic sheeting), securing safe drinking water and adequate sanitation facilities (e.g. water wells or tanks and latrines) and medical and health services (OCHA Reports 5, 11 & 16, 2000). In order to prevent increased health risks, it became imperative to deliver aid to those that were displaced outside of accommodation centres, so that larger populations were not attracted to these centres (OCHA Report 14, 2000). Children that were separated from their parents or caregivers created an additional concern (OCHA Report 13, 2000).

According to the government, cited in OCHA Report 13 (2000), many people that were stranded on roof-tops refused to leave because they were expecting to return to their homes shortly as the flood waters recede. As water levels began to slowly recede along the Limpopo River, families started to return home from accommodation centres. Local authorities warned them about the health and flood risks of their early return though (OCHA Report 16, 2000). The UNDP Resettlement Unit monitored the shelter initiatives of the NGOs in the affected areas. Plots of land and resettlement kits were allocated to families (Martin, et al. 2001/2002:28). The main difficulty in the resettlement process was the lack of capacity at district and provincial levels to analyse the environmental impact of settlement in new areas, as well as the demarcation of plots for distribution (OCHA Reports 28 & 29, 2000). The following table provides a chronological overview of the displacement situation that occurred in the Mozambican flooding of 2000.
Table 9. The displacement situation in Mozambique in 2000.

<table>
<thead>
<tr>
<th>Date</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/03/2000</td>
<td>More than 250 000 displaced were estimated to be in accommodation centres in Maputo, Gaza, Sofala, Inhambane and Manhica provinces.</td>
</tr>
<tr>
<td>08/03/2000</td>
<td>About 74 accommodation centres were operational. 20 000 people were found stranded about 50km from Mabalane (Gaza province). Relief items had to be delivered to them by helicopter.</td>
</tr>
<tr>
<td>14/03/2000</td>
<td>A total of 97 centres were registered.</td>
</tr>
<tr>
<td>mid-May</td>
<td>Almost all the accommodation centres were closed.</td>
</tr>
<tr>
<td>end-August (7 months since the start of the flooding)</td>
<td>NGOs had assisted with rebuilding nearly 40 000 houses, which constitutes about 60% of the estimated affected houses.</td>
</tr>
</tbody>
</table>


f) Health and disease
No reports regarding health and disease as a result of the 2000 flooding in Zambia were found. The only reference made to the population’s physical wellbeing was that they were placing themselves in a dangerous situation by diving into the waters from canoes, in order to save their crops. At least one person was reportedly attacked by a crocodile because of this action (BBC, 2000).
In comparison to Zambia, the situation in Mozambique had reached critical proportions in terms of health and disease. The Ministry of Health found that almost all the health care networks in the flood affected provinces had been affected (OCHA Report 26, 2000). The percentage of health care services that were affected included:

- 96% in Maputo,
- 90% in Gaza,
- 93% in Inhambane and
- 94% in Sofala.

The damaged or affected water and sanitation sources resulted in the rise and spread of water borne diseases. The most frequently reported diseases were malaria, diarrhoea, respiratory and skin diseases (OCHA Report 15, 2000 and USAID, 2000b). Although cholera cases had been reported in Maputo and Sofala provinces, it was not of epidemic proportions. For example, the Ministry of Health did not regard the 12 confirmed cases of cholera reported in Maputo as an epidemic (OCHA Report 22, 2000). A total of 94,577 cases of malaria were registered in the first quarter of the year in Mozambique (OCHA Report 25, 2000).

The percentages of patients seeking treatment, according to illness, were:

- 21% malaria,
- 21% diarrhoea,
- 18% respiratory diseases and
- 40% other ailments (OCHA Report 22, 2000).

Such a large number of ill people would strain the country’s medical (and other) resources, reduce productivity, decrease the number of available bread winners, and ultimately impact the population’s food security.

In addition to malaria, cases of severe malnutrition and dehydration among children under the age of five were reported. A survey in 5 accommodation centres in Gaza and Inhambane provinces found that 0.4% of children were severely malnourished and 6% suffered mild to moderate malnutrition. The incidence of diarrhoea was very high amongst children who were severely and moderately malnourished (OCHA
Report 24, 2000). In Massangena district (Gaza province), an increase in malnutrition was observed, and authorities therefore considered establishing a therapeutic feeding centre (OCHA Report 28, 2000). Shortages of medical supplies, staff and facilities were very apparent. For example, in Macia hospital, all 100 beds were occupied, and other patients had to use the floor (OCHA Report 17, 2000). Examples of the requirements in Mozambique’s health sector during the 2000 flooding are presented in the following diagramme.

**Figure 28.** Health care needs in Mozambique in 2000.

![Diagram of needs at various hospitals and/or health posts include:

- drug supplies
- HIV spot testing
- blood bag stock
- malaria testing kits
- health care personnel
- health care facilities


Family hygiene kits were distributed to the affected populations. The greatest difficulty was to treat people who were returning to the unsafe areas in Tete and Zambezi Valley. In addition, the receding waters exposed human corpses and dead animals, presenting a serious health hazard (OCHA Reports 14 & 17, 2000). Not only were diseases and illnesses problematic, but a terrible threat to people’s physical safety was further encountered as flooding appeared to have moved landmines to non-mined areas (OCHA Report 28, 2000).

Clearly, the impact of the flooding on the population’s health status was a very serious concern. Not only did illnesses arise from the flooding, but the unhygienic conditions (e.g. infected water, unburied corpses and overcrowding) all contributed to the spread of disease amongst the healthy members of the population. Table 10 illustrates a chronological sequence of events, with regard to the health and disease situation in Mozambique during the 2000 flood disaster.
Table 10. The health and disease situation in Mozambique in 2000.

<table>
<thead>
<tr>
<th>Period</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>early-March</td>
<td>Medicine stocks in each district were sufficient, but the main difficulty was a lack of access to certain areas.</td>
</tr>
<tr>
<td>08/03/2000</td>
<td>In Nova Mambone and Doane (Inhambane province), malaria cases rose from 85 to 340 within a week.</td>
</tr>
<tr>
<td>from January to 13/03/2000</td>
<td>1,811 cases of cholera and 11 deaths from the disease were registered.</td>
</tr>
<tr>
<td>end-March</td>
<td>Maputo – the suspected cholera cases were estimated to be about 860, compared to 295 cases at the same time in 1999. 16,773 cases of Malaria were registered - about 5,000 more cases than at the same time in 1999. A rapid increase in acute diarrhoea was occurred - rising from 56 cases (beginning of March) to 1,258 cases (end of March). Inhambane province – there were about 15,000 more cases of malaria compared to the same period in 1999.</td>
</tr>
<tr>
<td>by about 19/05/2000</td>
<td>A decline reported in the number of acute diarrhoea and cholera cases.</td>
</tr>
<tr>
<td>by June</td>
<td>Malaria cases decreased in Maputo but were still high in other areas.</td>
</tr>
<tr>
<td>early-July</td>
<td>Mapai health centre in Chicalacuala (Gaza province), were still reporting 15 to 20 new cases of malaria daily.</td>
</tr>
</tbody>
</table>

5.2.3. Causes of the 2007 flooding in Mozambique and Zambia

The Mozambican floods of 2007 began at different times, affecting different areas. The following table of flooding events illustrates this.

Table 11. Mozambican flooding of 2007.

<table>
<thead>
<tr>
<th>Start and end dates</th>
<th>Areas affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/01/2007 until February 2007</td>
<td>The provinces of Sofala, Zambezia, Manica &amp; Tete.</td>
</tr>
<tr>
<td>19/12/2007 – 02/01/2008</td>
<td>Inhambane and Sofala provinces.</td>
</tr>
</tbody>
</table>


Localised flooding was experienced since the beginning of the year, and large-scale flooding was anticipated as the National Water Directorate (DNA) decided to increase the discharge rate from the Cahora Bassa Dam. Continuous rains along river tributaries in Zambia and Malawi resulted in rising water levels in the dam. Heavy rains across Zambezi River Basin increased levels along the Zambezi River and the major tributaries (OCHA Reports 1 & 2, 2007).

By 12/02/2007 to 13/02/2007, major flooding was expected in the Zambezi River Valley because of an increased discharge rate. This would have affected areas in Sofala, Manica, Tete and Zambezia provinces (see figure 26 for a map of the Mozambican provinces). On the 21/02/2007, Cyclone Favio was expected to strike Inhambane, before passing close to the city of Beira (OCHA Reports 2 & 7, 2007).
According to the International Federation of Red Cross and Red Crescent Societies (IFRC) (2007:2), cyclone Favio struck on the 22/02/2007 and caused 9 deaths and affected 133,670 people in Vilanculos, Inhassoro, Govuro and Massinga. On the 25/02/2007 there were reports of 2 more tropical cyclones (Gamede and Humba) forming in the Indian Ocean. Fortunately for Mozambique, these cyclones weakened and passed over Madagascar instead (OCHA Report 9, 2007).

The Zambian flooding of 2007, like Mozambique’s flooding, began at various times and affected different areas. This is illustrated in the following table. The map of the Zambian provinces, figure 29, has been included for reference purposes.

**Table 12.** Zambian flooding of 2007.

<table>
<thead>
<tr>
<th>Start and end dates</th>
<th>Areas affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/01/2007 – 10/05/2007</td>
<td>Copperbelt, North-western, Central, Western and Southern provinces.</td>
</tr>
</tbody>
</table>

Excessive rainfall since December 2006 caused widespread flooding (United Nations Children’s Fund (UNICEF), 2007:2). The Luangwa district, where the Zambezi and Luangwa Rivers meet, was an area that caused grave concern. The rivers’ water levels worsened due to backwashes from the Cahora Bassa Dam in Mozambique, causing serious flooding. Flash floods also occurred in numerous areas (CAP, 2007:1 & 3).

The situation worsened in mid-February when the Zambezi, Kafue and Luangwa Rivers burst their banks. By 21/02/2007, the Zambezi River had been overflowing its banks for nearly 1 month. The Zambezi River read 6,9m (the highest level since monitoring started in 1957) and the river levels continued to rise (CAP, 2007:3).

5.2.4. Consequences of the 2007 flooding in Mozambique and Zambia

The Mozambican flooding of 2007 claimed 40 lives and affected another 485 000 persons (Appendix 1). The Ministry of Agriculture’s Technical Secretariat for Food Security and Nutrition (SETSAN) drew up a Floods/Drought/Cyclone Action Plan that stated that these three disasters which struck Mozambique in the past few months,
had destroyed 277 000 hectares of crops and affected nearly 1,1 million people, of which 750 000 required assistance (OCHA Report 11, 2007). Even though this disaster did not reach the same catastrophic magnitude as the 2000 flooding, it was still large enough to cause significant damage and complications.

It was recorded that 1 553 531 persons were affected in the Zambian disaster and 5 lives were lost (Appendix 1). Crops and food stocks were swept away in the affected areas and many of the surviving crops had been stunted (CAP, 2007:15). In the Southern province, fish camps were also submerged (CAP, 2007:4). The 2007 flooding had a greater impact on Zambia than on Mozambique, during this period.

a) Farming and fishing
SETSAN reported in March, that the 3 disasters that ravaged Mozambique, had destroyed 277 000 ha of crops (OCHA Report 11, 2007). Hence, tens of thousands of people were in urgent need of food assistance because crops and stocks had been destroyed. In Zambia, widespread crop loss, specifically the loss of germplasm and traditional species, affected agriculture. A number of fish camps were destroyed as well in the Southern province (CAP, 2007:4 & 16).

b) Logistics and transport
In Mozambique, at the beginning of February 2007, Mutarara and Zumbo districts (Tete province) were completely cut off by road. Roads were also affected in Caia, Marromeu and Chemba districts (Sofala province). Inhangoma was only accessible by helicopter (OCHA Reports 1, 2 & 4, 2007). An air bridge to transport food supplies was set up from Beira to Caia (OCHA Report 10, 2007). Aircraft were provided to assist with relief operations (IFRC, 2007), but high capacity boats were also needed. As flood levels receded, many communities were inaccessible by road or boat because of extremely muddy conditions. In the middle of March, the only option in many areas for the distribution of supplies was by helicopter (OCHA Report 12, 2007). For example, Tete province’s schools and accommodation centres were inaccessible by road for the distribution of supplies.

In Zambia, some areas like the Zambezi district were inaccessible and the effects of the floods were unknown in these regions (CAP, 2007:3). Damaged roads and
bridges caused the cessation of mobile clinics and the transport of patients to referral centres (CAP, 2007:6). Namwala, Lukulu, Chadiza and Mambwe districts were only accessible by 4-wheel drives. The potholes and gullies that had formed in the roads made access to many areas problematic (Zambia Vulnerability Assessment Committee (ZVAC), 2008:14). The government utilised army helicopters and boats for relief operations.

c) **Buildings and infrastructure**

At the beginning of February in Mozambique, the following structures had been affected by the flooding, namely:

- 4 677 houses,
- 111 schools and
- 4 health centres (OCHA Report 2, 2007).

In the Zumbo district, at least 60 houses were washed away. The local hospital in Vilanculos was seriously damaged by the cyclone. Several health workers also lost their homes during the cyclone (OCHA Report 12, 2007). By March 2007, the damage to infrastructure was estimated at US$ 71 million (OCHA Report 13, 2007).

In Zambia, the Vulnerability Assessment Committee (VAC) found that 10 954 houses were destroyed. In Mpulungu alone, 2 000 houses were destroyed. About 160 schools in 31 districts had been affected. In some areas, schooling was disrupted (possibly for more than 1 month). Approximately 150 000 children had their schooling disrupted and school staff houses and toilets were damaged (CAP, 2007:6). Apart from a few clinics, most of the health infrastructure was not damaged.

d) **Water and sanitation**

An old water supply system that was linked to an electrical grid was not operational in Vilanculos, Mozambique. The pumping station of the second water system, operated by diesel generators, was not affected by the cyclone. This pumping station provides water to 60% of the city. Three, small, solar powered water supply systems were operational and four water bladders were organised (OCHA Report 10, 2007). In Zambia, the water supplies and sanitation systems were affected by heavy rains and
localised flooding as well (CAP, 2007:12 and UNICEF, 2007:2), but no details concerning the extent of the damage were presented in the literature though.

e) Displacement and resettlement

In Mozambique, at the beginning of February 2007, it was estimated that (depending on the discharge from the Cahora Bassa Dam) between 50 000 and 300 000 people would be displaced. Local authorities were therefore ordered to work towards establishing accommodation centres (OCHA Report 1, 2007). The INGC planned the possible evacuation of 300 000 in river communities in the areas outlined in figure 30.

**Figure 30.** Areas planned to undergo possible evacuation.

![Possible evacuation of:]

- 7 districts in Tete province
- 3 districts in Manica province
- 3 districts in Sofala province
- 3 districts in Zambezia province


Over 140 000 were displaced in Zambezia Valley, following heavy rains in Mozambique and its neighbouring countries earlier in February (OCHA Report 9, 2007). Across the country, hundreds of thousands were displaced. Orphaned and vulnerable children, especially, became a great concern. As of 18/02/2007, there were 55 accommodation centres in Caia (Sofala province). Forty activists from Save the Children prepared to conduct orientation on protection issues, in these accommodation centres (OCHA Report 6, 2007).

In the beginning of March, the Mozambican Red Cross estimated that 61 000 were in need of shelter in the area hit by cyclone Favio. It was further estimated that an additional 20 000 may be in need of shelter assistance in flood hit provinces (mostly in areas that were difficult to reach) (OCHA Report 12, 2007). In Vilanculos, after the cyclone, public health and accommodation became major priorities. By the middle of March, even though the floods subsided, some camps reported a continuous growth
over the weeks. This could be attributed to food shortages in rural areas and availability of food at shelters (OCHA Report 13, 2007).

Accommodation centres were in need of resources, but many of them were inaccessible by road, and in some cases, even by boat. Another dilemma loomed when flood water approached the accommodation centre in Jardim (OCHA Report 2, 2007). A total of 80 police officers were deployed to accommodation centres in flood affected provinces, to assist with protection issues (e.g. violence against women and children) (OCHA Reports 6, 7 & 13, 2007).

In early March, the people of Vilanculos were returning to their homes to rebuild their roofs (OCHA Report 10, 2007). Hence, no long term displacement was foreseen. In Tete province, 400 plots for resettlement purposes had been demarcated and other areas not at risk of flooding were identified. Two more resettlement areas in Caia and Chupanga (Sofala province) were identified as well (OCHA Report 11, 2007).

In Zambia, the VAC calculated a total need of 2,832 tents for 17,172 displaced persons (CAP, 2007:6). Some of the displaced were housed in tents, rural health centres and makeshift shelters. Many of the affected were also accommodated by family, or in schools or other public buildings. In the Central province, the affected urban populations had to find shelter in public places (CAP, 2007:4).

Many households on the flood plains had not moved to higher ground and they may have required encouragement to do so. Their positions were unsafe in the wake of rising waters, and it was increasing expenses to reach them with relief supplies. If they remained, they risked losing their assets and their lives (CAP, 2007:2).

f) Health and disease

In Mozambique, concerns emerged over basic hygiene, sanitation and water borne diseases. In Bawa (Zumbo district), high levels of diarrhoea and malaria were evident, but the population had no access to a health care facility (OCHA Report 2, 2007). Although there were no epidemic disease outbreaks in the camps, it was feared that without food, water and proper sanitation communicable diseases could arise and spread quickly (OCHA Report 9, 2007). Generally, diarrhoea was the most
common illness encountered in accommodation centres. In order to prevent cholera outbreaks, sanitation and hygiene or health education was a priority in affected areas (OCHA Report 7, 2007). A need for thermometers, drugs for primary health care, health promotion, personal hygiene and increased disease surveillance was recognised. Indoor Residual Spray activities in centres in Caia were disrupted by tropical cyclone Favio’s arrival (OCHA Report 8, 2007).

Apart from treating diseases that arose from the flooding, other health care or health promotion initiatives were practiced (IFRC, 2007). For example, the OCHA Situation Reports 12 and 13 (2007) noted the following:

- Radio Mozambique broadcasted cholera prevention messages in Portuguese and the local languages.
- Female hygiene kits were distributed.
- 7 117 children received de-worming treatment while 5 935 received vitamin A supplementation.
- Technical guidance, on infant and young child feeding and support for pregnant women, was given to the local health authorities and NGO partners involved in the supplementary feeding programme.
- Across 4 flood affected provinces, some 6 913 children were screened. Hence, 606 moderately malnourished children received BP5 supplements, and 35 severely malnourished were referred to hospital for treatment.

As seen above, officials recognised that nutritional intervention was also an important part of health promotion. Ideally, the nutritional status of a population should always be taken into account when dealing with food security issues, as this will determine the kinds of foodstuffs (or interventions) that are required. Such awareness would serve to benefit the targeted population immensely, and lessen the effects of a poor nutritional intake.

Table 13 illustrates a chronological sequence of events, with regard to the health and disease situation in Mozambique during the 2007 flood disaster.
**Table 13.** The health and disease situation in Mozambique in 2007.

<table>
<thead>
<tr>
<th>Period</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>end of February</td>
<td>Conjunctivitis became a major public health concern in Caia, Mopeia and Mutarara.</td>
</tr>
<tr>
<td>22/02/2007</td>
<td>Established that no cases of cholera or measles were reported in affected areas.</td>
</tr>
<tr>
<td>end of February</td>
<td>The most urgent needs identified were health facilities for primary care, psychological counselling, health education, hygiene promotion, as well as food, shelter, water and sanitation facilities.</td>
</tr>
<tr>
<td>mid-March</td>
<td>No epidemic outbreaks were reported, but there was a need to strengthen surveillance.</td>
</tr>
</tbody>
</table>


Like in Mozambique, an increase in water borne diseases was very likely to occur in Zambia (UNICEF, 2007:2). In 78% of the areas (affecting over 1 million people) the risk of water contamination, from faecal matter in particular, was considered high or very high (CAP, 2007:6 & 11). The VAC reported that the Copper Belt, Eastern, Central, Western, North-Western and, Northern provinces were at a high risk for diarrhoeal diseases from water contamination (CAP, 2007:6). The Southern province had a high potential for health and nutrition problems because of contaminated water sources and a high level of vulnerability.

Vitamin A supplementation and de-worming was to be incorporated into a measles campaign that was planned from 9 to 15 July (CAP, 2007:4). Identified priorities were
health surveillance, strengthening of immunisation campaigns and psycho-social support. Rapid provision of drugs, oral rehydration salts, malaria prevention supplies, and transport and logistics services were needed (CAP, 2007:9). The VAC recommended the use of chlorine for water treatment and the enhancement of community programmes on public health and hygiene (immediate term) and the rehabilitation of boreholes (long term). It was feared that preventable morbidity and mortality would increase because of impeded transportation (CAP, 2007:6).

The Ministry of Health released stocks of drugs and equipment to meet immediate healthcare needs, and as a result, the normal stocks in the country were affected. Thus, UNICEF and WHO needed to support the government with their regular supply. (CAP, 2007:9). Like Mozambique, diarrhoeal disease arising from water contamination was common, there was a high risk for malaria outbreaks and other illnesses related to the flooding (CAP, 2007:6 & 9). Supplementary feeding interventions were designed to stabilise the nutritional status of affected, vulnerable populations and special assistance had to be provided to pregnant and lactating women and children. The need for psycho-social support for children was recognised as well (CAP, 2007:6).

5.3. Local and international management and intervention

a) Management and intervention in Mozambique and Zambia in 2000

Regarding Zambia, the BBC (2000) reported that there were no preparedness policies or actions in place to help the population cope with the sudden increase in waters. No information relating to the government or other organisation’s involvement in this process was found in the documents consulted, either. This issue will be explored in the next chapter dealing with the discussion of the results, as it has many implications for the development process.

On the contrary, Mozambique’s flooding in 2000 was experienced with such great magnitude that it could not be ignored or downplayed by the government or the international community. The Mozambican government was forced to take action and call upon the assistance of various governments, agencies and institutions and, as a result, more than 200 NGOs worked together with the authorities (Martin, et al.
The widespread destruction throughout Mozambique required financial, manpower, as well as other types of assistance and/or aid. However, rescuing people and saving lives became the first and foremost priority identified (OCHA Report 11, 2000 and UNDP, 2000:4-8).

The INGC arranged for the evacuation of people from affected areas (OCHA Report 2, 2000). The INGC worked together with the WFP, FAO, USAID, various governmental ministries, as well as other national and international organisations. The Mozambican authorities addressed the post-flooding strategies and interventions with great urgency. Already in early February, while working on relief operations, the government (together with other agencies), began investigating rehabilitation and development projects (OCHA Report 5, 2000).

An On-site Operations Coordination Centre (OSOCC) was established to secure the coordination efforts between national emergency services, UN agencies, international organisations and NGOs, thereby further consolidated the successful management of the disaster (OCHA Report 7, 2000). This was an important action, as each agency or organisation had their own area of expertise (e.g. the WHO and Médecins Sans Frontières (MSF) worked on health-related issues, while the South African National Defence Force (SANDF) carried out air rescue and distribution operations) (OCHA Report 6, 2000). These specialised tasks had to be coordinated and directed to instances or places most needed, so that its’ maximum benefit could be achieved. The Mozambican authorities’ good organisational and management skills were highlighted, as they planned a ‘lessons learned’ exercise for the end of April 2000, together with the INGC and OCHA’s participation (OCHA Report 25, 2000).

Various conferences and meetings were held throughout 2000, to address the issues related to the flooding in Mozambique. The largest gathering was probably the Reconstruction Conference that was held in Rome on 3 and 4 May 2000. It was attended by 306 participants, who represented 40 countries, 19 UN agencies, 22 regional international organisations and 15 Mozambican and foreign NGOs. A staggering US$ 452, 9 million was pledged at this conference, to assist Mozambique in emergency and recovery operations (OCHA Report 26, 2000). This amount was over and above other financial assistance received from various countries (e.g.
Norway, Canada and Italy) and agencies (e.g. United Nations Population Fund (UNFPA) and UNDP). Donations from these different sources amounted to millions of US$ as well (OCHA Report 11, 2000).

b) **Flood disaster food aid in Mozambique and Zambia in 2000**

Apart from financial assistance and supplies and/or equipment such as boats for rescue and distribution operations, drinking water, blankets, medicines, tents, latrines and other non-food items, there was a dire need for food in Mozambique. The following summarised description of the food aid provided during this flooding event, creates an idea of the scope of the disaster.

From the start of the operations on the 11/02/2000, until 09/05/2000, the WFP had distributed approximately 7 118, 1 tons of food items. The food distribution benefited 589 632 persons at 292 distribution points in 6 provinces and Maputo city (OCHA Report 26, 2000). The affected population's desperation can be illustrated in an example of a riot that broke out (injuring 10 people and killing 5) at a camp in Gaza province, because of unplanned and unforeseen food distribution (OCHA Report 21, 2000 and USAID, 2000b). Hundreds of thousands of people required food assistance and in early June it was found that unless the need to feed 650 000 persons was reduced, the food supply would run out before August (OCHA Report 27, 2000 and USAID, 2000b). These numbers do not include those that may have been overlooked due to their remote locations. Hence, the amount of people affected by, and facing hunger because of, the flooding may have been larger than originally estimated.

Crop planting and/or growth were hampered because of soil conditions, and fishing and livestock farming were not advancing either because of the loss of tools and equipment (e.g. canoes) (OCHA Report 29, 2000). Early in July 2000 the WFP (bearing production predictions for the September harvest in mind) decided to extend its emergency food distribution until April 2001 (OCHA Report 28, 2000). They also extended their emergency operations on the 26th of September, to assist over 172 000 people still facing severe food shortages (OCHA Report 30, 2000). Agricultural kits were distributed to assist the population in resuming their food production activities, but it was found that food and seeds needed to be delivered
together so that people could be prevented from eating the seeds (OCHA Report 22, 2000).

The only information regarding aid for the 2000 flood disaster in Zambia, related to seed supplies which would be purchased locally and distributed to the affected population (Mpofu, 2000:30-33). Seed distribution was set to cost roughly US$ 246 000.

Although Mpofu (2000:34) states that the DMMU, together with the Ministry of Agriculture, Food and Fisheries, undertook a rapid needs assessment so that donor support could be sourced for the affected population, no further details of this assessment or the government’s involvement could be found. This research did not clearly reveal how the population coped with the crop loss and their prospective food insecurity. It appears that the population was left to fight this battle mainly on their own, without adequate support from the authorities.

c) Management and intervention in Mozambique and Zambia in 2007

The INGC again managed the disaster response coordination in Mozambique in 2007. They also drew up various plans (e.g. US$ 20, 2 million plans for the establishment of accommodation centres and plans for the distribution of supplies to accommodation centres) (OCHA Report 2-4, 2007). Supported by UNICEF, the INGC created a matrix so that the various partners could map the locations and areas of expertise in which they were working (OCHA Report 7, 2007). The government’s US$ 71 million recovery and reconstruction plan was launched on 5 March 2007. The areas requiring attention, as identified in the plan, are illustrated in figure 31.
Figure 31. The focal areas of the Mozambican government’s recovery and reconstruction plan.


An Interagency Map Centre was established to support humanitarian efforts. This centre assisted with the dissemination of web data archives, catalogue of datasets, statistical tables and charts, alerts data bulletins, maps and printed copies of maps. It also supported the “Who does What Where” data collection and mapping procedures (OCHA Report 10, 2007). In mid-March, the government appealed to institutions such as UN agencies, the private sector and NGOs to continue assisting victims so that the recovery process could be sped up (OCHA Report 13, 2000).

Furthermore, a cluster approach was implemented to ensure that the government received coordinated support (OCHA Report 5, 2007). The various clusters and the partners responsible for their activation were, namely:

- Food security – WFP/FAO,
- Nutrition – UNICEF,
- Health – WHO,
- Water, sanitation and hygiene – UNICEF,
- Education – Save the Children Alliance/UNICEF,
- Protection – Save the Children Alliance/UNICEF,
- Shelter – IFRC/Mozambique Red Cross,
- Logistics – WFP,
- Telecommunications – WFP, and
- Early recovery – UNDP.

Hundreds of thousands of displaced people sought refuge in accommodation in centres. However, already by the end of February 2007, the government had set up a team to begin working on the resettlement plan in Zambezia province and the first draft was expected to be ready on 10 March (OCHA Report 7, 2007).

Likewise, in Zambia in 2007, UN agencies, national and international NGOs, the private sector and other institutions, had supported relief efforts in the country (CAP, 2007). An estimated US$ 8 852 453 was needed for 3 months of relief operations (of which US$ 3 million was required by the food security sector) and various agencies responded with substantial financial donations (CAP, 2007:1).

Over the latest years, the international community has made a substantial contribution in support of the national capacity for disaster management (especially to strengthen food security). This became evident in the leadership position that the Zambian government took during the flood response, as well as in the affected communities’ ability to recover quickly from the disaster. Relief and recovery operations were divided into two phases, namely:

- 1st phase – focused on relief over a 3 month period.
- 2nd phase – focused on recovery and therefore required a long-term perspective. These long-term interventions required that a strategy had to be developed and funding for the activities had to be determined (CAP, 2007:8).

Since the start of the floods, the government, directed by the DMMU, led the way in assisting the affected population with the most immediate and critical needs (CAP, 2007:4). This response appeared to be better managed than the action that was taken in 2000. The DMMU, assisted by ZVAC, conducted a rapid assessment and the results were presented on 15 March 2007. Based on this assessment, the government requested the international community’s aid in responding to the needs of the affected population. The two objectives of the Inter-Agency Standing Committee’s (IASC) response plan, as identified by CAP (2007:1), were to:

- provide relief assistance to reduce the humanitarian crisis;
ii. prevent disease and secondary hazards, restore some agricultural losses and add to solutions that can be sustained, by replenishing relief items in expectation of more flooding.

The DMMU delivered tents, chlorine and mosquito nets and made boats available for rescue and distribution operations. Almost US$ 100 000 was given to the shelter sector for issuing warnings to people to leave the floodplains and to assist them with a cash grant for resettlement (CAP, 2007:4-8).

d) Flood disaster food aid in Mozambique and Zambia in 2007

Thousands of tons of food were distributed in Mozambique during the 2007 flooding event, just like during the 2000 disaster. However, during this later event, authorities and officials were more alert to certain issues regarding food security. For example, there were concerns that a growing number of people moved to camps so that they could be included in food distribution lists. Various strategies to cope with this problem were therefore considered (OCHA Report 12, 2007).

The food security cluster planned to assist about 200 000 in the cyclone affected areas and about 263 000 in the Zambezi area, through food-for-work, food-for-assets and vulnerable group feeding rations from May to July. Possibly thousands more, were in need of emergency food assistance for roughly four months because they would only benefit from a second harvest in June/July if they began planting in March (OCHA Report 11 & 12, 2007). The government, and other organisations, carried out plans in March to support this second agricultural season with vegetable seed kits, beans, cassava, fruit and other trees (IFRC, 2007:6). This season was estimated to produce outputs that could reach 60 000 tons of food (16 000 tons of maize, 6 000 tons of beans and 40 000 tons of various vegetables) (OCHA Report 13, 2007).

Zambia used their own stock for immediate food relief needs that were managed by the government. The objectives of the food security sector were to:

i. provide food relief to 295 148 for 2 months (7 084 tons needed),

ii. strengthen the livelihoods of the flood affected, farming households through the provision of agricultural inputs and implements, the rescue, multiplication and dissemination of adapted traditional crop varieties, the training of small
scale irrigation techniques and the immunisation and treatment of cattle (CAP, 2007:15).

The DMMU delivered thousands of tons of food aid. It was anticipated that the government could continue to cover food relief operations, but there were concerns by UNICEF (2007:3), that the food security situation would worsen as food stocks depleted. Further assessments of the food security situation were set to be carried out in May to determine the food situation for the remainder of 2008/2009 season (CAP, 2007:5). The FAO supported the fielding of rescue, or collection, missions to flood-affected areas to save valuable germplasm resources. These germplasm varieties were important because they were adapted to specific farming systems or farm ecologies (CAP, 2007:16). Since the flooding and excessive rainfall increased various water sources (e.g. ponds, rivers, dams, springs and lakes), it presented an opportunity to promote dry season cropping. Dry season cropping would have helped to cover food shortages, and it would have allowed the multiplication of adapted crop varieties in preparation for the main planting season in November/December. This action was expected to improve food availability, seed and planting materials at household level. (CAP, 2007:16)

Importantly, the FAO aimed to provide vaccines and drugs for up to 200 000 cattle against Contagious Bovine Pleuropneumonia (CBPP) and up to 250 000 cattle against Anthrax, Black Quarter and Haemorrhagic Septicaemia. This intervention would have helped vulnerable households to maintain their asset base, thereby aiding their recovery from this flooding (CAP, 2007:16). This crucial step in promoting food security was not mentioned in the OCHA Situation Reports of the 2000 and 2007 Mozambican flooding.

5.4. Conclusion to results

Appendix 1 depicts eastern Africa as the region that contains the largest populations affected by flood disasters in 2000 and 2007. As shown earlier, the last decade especially, has seen an increase in the frequency of flooding in Mozambique and Zambia because of climate change. The literature review revealed that this pattern of climate change, together with its associated extreme weather events, is not expected
to change in the near future either. It can therefore be expected that eastern Africa will be ravaged by other extreme weather events in the coming years. Hence, an understanding of how these events affect a population are of extreme importance so that a plan of action, which addresses security and adaptation especially, can be designed to deal with its’ occurrence.

Using a multitude of reports from institutions and organisations like OCHA and EM-DAT, it was found that the 2000 and 2007 flooding in Mozambique and Zambia (predominantly caused by heavy torrential rains and cyclones) had resulted in widespread destruction. Apart from directly affecting millions of individual lives, the aftermath of the flooding was felt across various industries and infrastructures. The scale of the devastation is illustrated in the following summary of the consequences of the 2000 and 2007 flood disasters:

- transportation and other channels of communication were disrupted,
- farmlands and implements were damaged or destroyed,
- crops and livestock were lost,
- fishing equipment and stocks were lost,
- hospitals and schools were damaged,
- electricity supply was disrupted,
- water sources were polluted or destroyed,
- markets were closed and
- houses were damaged and/or destroyed, thereby causing displacement.

The population’s food security was directly affected by the loss of crops and livestock, as well as cultivated land and implements used for farming and fishing. A loss of household food stores also occurred when homes were destroyed. Indirectly, flooding’s effects on the populations’ health, earning and/or employment opportunities, transport routes and homes, all influenced the availability of food, as well as the populations’ access to it.

Understanding the national and international management and intervention in flood disasters are just as important as understanding flooding’s causes and consequences. How these various institutions deal with such a disaster has a very
strong bearing on how the population will be assisted and equipped to deal with issues of food insecurity that may arise from the disaster. The research revealed that the Zambian authorities were not particularly helpful during the 2000 event, but that they improved in their approach in the later disaster. In comparison, the Mozambican authorities showed better management skills of the catastrophic events which occurred within their borders. The international community were also involved in the post-disaster management and intervention activities of Mozambique and Zambia (apart from the 2000 Zambian disaster). This was necessary to strengthen the national institutions’ ability to deal with the disaster and provide relief to the affected populations. A more detailed discussion of local and international management and intervention is presented in the following chapter that discusses the results.

Both the international and national communities played a significant role in providing food aid so that starvation could be prevented. Except for the 2000 Zambian disaster, relief food aid was provided to populations that were stranded in inaccessible areas or that were housed in accommodation centres. In 2007, Mozambique implemented food-for-work and food-for-assets programmes, instead of simply handing out food aid. This approach was necessary to ensure a swifter recovery from the disaster, but also to decrease the population’s dependency on aid. However, apart from providing food aid, assistance was also provided to the:

i. destitute and homeless, through the provision of temporary shelters, and the
ii. ill and injured, through the provision of health care services.

Various other forms of assistance are noted, but not limited to, the information contained in the following figure.

**Figure 32.** Examples of additional forms of assistance and support provided.

<table>
<thead>
<tr>
<th>Support and assistance was also provided in the form of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>seeds for planting</td>
</tr>
<tr>
<td>farming and other utensils (e.g. cooking pots)</td>
</tr>
<tr>
<td>resettlement packages</td>
</tr>
<tr>
<td>hygiene kits</td>
</tr>
<tr>
<td>latrines</td>
</tr>
<tr>
<td>health education</td>
</tr>
</tbody>
</table>

Although support and assistance during and after a disaster is imperative, it is even more crucial for institutions to establish and provide workable solutions for prevention, coping and adaptation methodologies. This approach would help a population to maintain a high degree of the original state of their livelihoods and it would assist the development process through the establishment of policies and/or programmes, during a disaster like flooding. The UNISDR found that, by June 2007, Mozambique and Zambia were in the process of outlining their Disaster Risk Reduction (DRR) legislation (UNISDR, 2007:12). This is a necessary step in the process of reducing the effects of disasters, especially those caused by extreme weather. Proposed recommendations, adaptation and disaster management strategies will therefore be examined later in chapter 7.

Although the research has disclosed important facts and information about the 2000 and 2007 flood disasters in Mozambique and Zambia, it is not enough to merely note the discoveries made. In order to satisfy the objectives of this research, the results need to be discussed, compared and criticised. Hence, the next chapter is aimed at an in-depth examination of the results.
CHAPTER 6: DISCUSSION OF RESULTS

The previous chapter has provided a sturdy foundation on which to build this discussion of the results. The causes of the 2000 and 2007 flooding in Mozambique and Zambia, both natural and man-made, have been identified. The consequences that it has had on infrastructure, the built environment, as well as the security and wellbeing of the populations concerned, have been determined and described. Hence, the way has been paved for an analysis and discussion of these results, within the developmental context.

Mozambique and Zambia suffered very similar causes and consequences during the flooding in 2000 and 2007. Both countries were subjected to intense, frequent and unpredictable weather events, pointing to the role of climate change in hydrometeorological catastrophes. However, as identified in the literature review, there are actually no risks when there are no people or valuable assets/infrastructures present that can be disturbed by a weather event. In the same manner, a disaster only occurs when people are injured and/or their possessions are destroyed (Kron, 2005:60 and Smith, 2001:7). As unveiled in the results chapter, the after-effects of the 2000 and 2007 flooding in Mozambique and Zambia included mass destruction, social disruption and even death, pointing to the fact that these incidences of flooding had indeed lead to disaster. One of the largest concerns related to these disasters, is that the affected countries are ranked amongst the poorest nations in the world. Both countries have a low human development index and are riddled with poverty (AQUASTAT, 2005a & 2005b). Their populations are struggling to satisfy the human and security needs that are each individual’s basic human right. It therefore goes without saying, that flood disasters will only push the already vulnerable people into further poverty and despair, impeding the entire process of development. As their securities are turned into insecurities, the number of hungry people will increase. Influenced by many factors (e.g. political, social, economic and environmental), the food security of thousands, if not millions of people will be threatened.

Besides the fact that the 2000 and 2007 flooding in Mozambique and Zambia were chiefly caused by extreme weather phenomena, man’s function and influence before,
after and during such episodes, are extremely important. Here, reference is made to
the human interference in the natural world that often exacerbates flooding. For
example, drainage is often poor in flood-prone districts, elevated roads and railway
lines can restrict drainage and prevent water from flowing away and construction
often occurs without bearing flood patterns in mind (Reuters Alertnet, 2007). Theron
(2007) also found that deforestation was blamed as a cause of flooding. A
combination of these factors are very likely to worsen, or increase the likelihood of
flooding in a given area, as was the case in the 2000 floods in Zambia, when the
opening of the Kariba Dam’s floodgates caused localised flooding. The literature
review’s examination of climate change and its consequences (e.g. ENSO
phenomenon, heavy rainfall, drought), seems to fit the premise that man’s actions
(e.g. carbon emissions and change of land use) are disturbing the balance of various
systems on earth and resulting in an increase in disaster trends. Hence, even though
the flooding in Mozambique and Zambia may essentially have begun because of
heavy downpours and storms, man’s contribution to these natural disasters cannot
be ignored either.

A vicious cycle therefore appears to be in place:

i. greenhouse gas emissions are causing climate change,

ii. weather patterns are being influenced,

iii. human development is being affected,

iv. decisions about how we treat and/or handle our environment exert an
   influence as well, resulting in

v. a repetition of the cycle.
Figure 33. Schematic representation of the process of climate change and flooding and its consequent impacts.

Sources: Adapted from APFM, 2006; Brown, 2004; Godrej, 2006; Marianti, 2007; Murphy, 2005; Rosenzweig, et al. 2007 and Young 1997.
Figure 33 provides a very relevant schematic representation of the process of climate change and its environmental and social causes and consequences. This schematic representation can be applied to Mozambique and Zambia, as well as to other countries that may experience such extreme weather events.

The intricacies of the changing climate present a subject that requires specialised knowledge and research. The environmental causes (e.g. storms, cyclones and torrential rains), in relation to climate change, specifically provide climatologists and scholars in the natural sciences with an interesting topic for investigation. The main purpose of briefly discussing climate change in the literature review and in the results section was to introduce the subject and depict its influence on extreme weather events that lead to disaster. Therefore, it will not be further explored in the following discussion. Instead, a comparison of how Mozambique and Zambia experienced, coped with and managed the catastrophic events of 2000 and 2007 surfaces as a more relevant topic for exploration in this research.

6.1. The impacts of flooding in relation to food security

The destructive nature of flooding presents a number of consequences. These consequences that impact the environment, society, economy, and even as far a field as the political arena, are experienced on an individual and a national level. The effects of flooding encountered within these various spheres then continue to influence a population’s food security. The impacts of flooding, with reference to the information provided in the results section, will therefore be explored in relation to food security. This discussion attempts to describe how the consequences of flooding, as encountered in different domains, affect a population’s access to food.

a) Impact of flooding on the environment

Although the flooding occurred during both countries’ wet seasons, the resulting impacts took months after the wet season had passed, before conditions improved. In the case of Zambia for example, flooding occurred again, just 7 months after the first bout in the first half of 2007 (Dartmouth Flood Observatory, 2008 and EM-DAT, 2008). This later flooding affected three of the same provinces that were impacted by flooding in the early part of 2007. In Mozambique, the repeated flooding in 2007 also
impacted many of the same areas for a second or third time giving the population and the environment very little time for recovery in between the disasters. For example, flooding destroys people’s homes, causing them to spend significant amounts of time and resources on repairing the damage. In the environment, flooding lessens the soil’s fertility resulting in poorer soil conditions for subsequent harvests (Theron, 2007).

These small breaks in between flooding events hardly allowed the countries to recover from their first extreme weather event, before they were struck again. Such repeated weather disasters will ultimately weaken an already vulnerable country’s socio-economic development and contribute to further poverty and hardships amongst its population. As this incidence of poverty intensifies, it will have further ramifications on the populations’ food security status. Ultimately, people become more vulnerable to later floods, after their assets have been destroyed (Alam, 2008).

b) Impact of flooding on farming and fishing
The impacts of flooding on farming and fishing are numerous, and can range from a household to a national level. When tools and implements are destroyed (e.g. hoes, ploughs, tractors, fishing boats and nets) it impedes the ability of people to swiftly resume farming or fishing activities. Without producing goods, they are not able to feed themselves or earn money (e.g. at the local market, or on a larger scale in the form of exports). Mozambique was subjected to widespread destruction in the 2000 flooding event, while both Mozambique and Zambia suffered far-reaching devastation from flooding again in 2007 (CAP, 2007; Martin, et al. 2001/2002 and OCHA Reports 1-13, 2007). These populations’ capacities to resume food production activities quickly were thus hindered.

The destruction and loss of implements are only one negative effect from flooding. Another, as mentioned earlier, is that flooding affects the quality of soil. Thus, even though farmers may have the required tools and implements, they could find that the conditions for planting are not favourable. In the same manner, fishermen may find that the weather conditions are not conducive to fishing either (e.g. high swells or heavy storms), thereby preventing them from going out on their boats. In Zambia, in 2007, there was also widespread loss of traditional crop varieties and germplasm
(CAP, 2007:16). These crop species were developed over an extended period of time and have been modified to special farming systems or farm ecologies. Subsequently, these crop varieties have an important function in the food security of the households that depend on them.

The loss of large amounts of cultivated land and food stores, as a result of the 2000 and 2007 flooding in Mozambique and Zambia, directly affected the populations’ food security status. In Mozambique in 2007, for example, an overwhelming 277 000 ha of crops were lost in the flooding (OCHA Report 11, 2007). As the OCHA report further stated, tens of thousands of people therefore required emergency food assistance. It is almost impossible to imagine exactly how much food 277 000 ha can produce, but it certainly was enough to feed tens of thousands of people at that present time, and also in the coming months. As a result, not only was the affected population left without food when the disaster occurred, but their food security for the coming weeks and months was also placed in jeopardy.

In an incident like the abovementioned, when large areas of cultivated land are destroyed, the population would have to wait until the next agricultural season before resuming planting (this could mean that they may have to wait for months) and then they would have to wait for the plants to grow before harvesting (which again could only take place after some months). Without food reserves or a crop to harvest, a population is left entirely at the mercy of national and international institutions for food assistance. If these institutions do not come to the population’s aid, then hunger and starvation would become rife. This perhaps provides a good example of the importance of good governance and management at a national and international level, as without it, thousands of people could be left to die of starvation in the light of a catastrophic weather event.

Apart from tens of thousands of hectares of cultivated land and tons of crops that were destroyed, Mozambique also lost approximately 80% of its cattle in the 2000 flood disaster (WFP, cited in Slaughter, 2000). As discussed in the country profiles, cattle fulfil a vital function in the Mozambican society, as they provide a valuable source of meat, milk, draught power, assets and status (Timberlake & Jordao, n.d.). In the same manner, cattle play an important role in the Zambian society too. Without
cattle, households would find that they do not have animals to assist with ploughing, there would not be any meat or milk or they would have fewer assets available for use in traditional customs (e.g. dowries). Other livestock too, are important sources of food. Even though the amount of sheep, goats, pigs and chickens that were lost in the flooding was not mentioned in the reports, one can assume that a large percentage of these animals were killed as well (using the cattle statistics as a measurement). Hence, it is more than likely that many households found themselves without crops and livestock that were beneficial food sources.

The most important point to consider here is that the destruction of farmlands, farming or fishing equipment, or loss of livestock are not the only aspects of flooding that impacts the food security status of a population negatively. The destruction of other structures and infrastructures carry as an important bearing on a population’s food security status.

c) Impact of flooding on built structures and infrastructures
Tens of thousands of homes were damaged or completely destroyed in the Mozambican flooding of 2000 (OCHA Report 29, 2000). Again, in 2007, thousands of houses were destroyed in Mozambique (OCHA Report 2, 2007) and Zambia (ZVAC, 2008:5). When homes and possessions are destroyed, people may find that they are left without cooking utensils with which to make food. Their food stores that were kept in the home may also have been destroyed, leaving them without any food sources on which to fall back on. Furthermore, the destruction of homes results in the displacement of a population. Without a safe place to live and shelter themselves from harm and the elements, a population may place their need for safety before their need for food (Meyer, et al. 1997:439). As a result, they may neglect the importance of finding food and drink and therefore become malnourished and dehydrated. Furthermore, when a displaced population is resettled to a new area, their overall development is more than likely heavily impeded, as they would have to concentrate on rebuilding their entire lives and starting afresh, instead of simply improving and/or advancing on what they already had at their disposal.

Likewise, when a population lose their tools and implements (e.g. ploughs and fishing nets) in a disaster, it has many repercussions on their future ability to secure food
availability and access. Without tools and implements, they would not be able to be productive. Rather than resuming farming and fishing, they would have to concentrate their efforts and finances on replacing the instruments that they have lost. Similarly to the destruction and loss of personal possessions, a household would be forced to unnecessarily spend their savings on replacing these essential assets so that they may restore their activities and livelihoods to its' former state.

In Mozambique in 2007, 111 schools were reportedly destroyed as of the beginning of February (OCHA Report 2, 2007), while in Zambia in 2007, 58 schools were reportedly damaged by flood waters (CAP, 2007:5). The damage to schools and the disruption of schooling may have serious consequences for the children who depend on school feeding schemes for food. Robbed of what may be their only possibility to acquire food and nourishment, these children would be left to go hungry. However, it is not only a school’s function as a food source that is of importance. In addition, repairing and replacing school facilities and equipment may take months to complete, thereby disrupting schooling and preventing learners from making steady progress in education.

When roads or bridges are submerged in flood waters, drenched in mud or completely washed away, areas or communities become isolated from the rest of the country (Martin, et al. 2001/2002:31), supplies are cut off and people are prevented from travelling to work or markets. This was the case in 2007 in the Zambezi district of Zambia, for example, when this area was cut off by road (CAP, 2007:3). Hence, even though a country may have adequate food supplies after a disaster, it may not be accessible to those who need it. In the same manner, even if people have money with which to buy food, it is of no use if food is not available in shops or markets because the transport routes have been disrupted. Conversely, when food is readily available but people are unable to travel to work, or to a marketplace to trade, they would not be able to earn money with which to purchase food. The interrupted transport routes also hamper mobile clinics and the transport of patients, with the result that the sick or injured may not receive the medical care that they need.

The interruption of essential services such as electricity and water supplies, as well as communication channels, also impedes a population’s ability to continue with their
daily activities. For example, refrigerators and freezers that are used to store food, and that ensure food safety, cannot operate without electricity. Polluted water sources and damaged sanitation systems encourage the spread of water-borne diseases like diarrhoea and cholera (OCHA Report 2, 2000), placing a further strain on the individual’s health, and ultimately on his/her ability to access and benefit from food. Without communication mediums like radios and telephones, a population may not be able to access important information or would not be able to make the necessary contact to request assistance.

d) Impact of flooding on the economy
The destruction of markets and workplaces (e.g. factories, farms or mines, to name a few) cripples a populations’ wage earning opportunities and therefore their ability to purchase food or seeds and implements for farming.

Depending on the scale of the disaster, enterprises such as factories may find that they are presented with a position that cannot be remedied. For example, if a factory was struggling financially already, and their facilities, equipment and/or materials are destroyed during a disaster, then they may find that they are unable to resume and proceed with usual business activities. If closure results then many people would be left unemployed and unable to earn money with which to buy food. With less spending taking place within the community, other business may find that they too are succumbing to a financial pinch – a situation that can continue to snowball to affect the economy on a national level. In the same manner, the flooded tourist lodges in Zambia, from the 2000 event (BBC, 2000), meant that these establishments had to close for business until they were repaired or cleaned up from the flooding. During their closure, they were not able to produce an income and if they were not insured it would have presented an added financial burden. The flow of tourists to the region would have plummeted as well. The decrease in tourists would have disturbed the economy in the area because of decreased spending by these visitors. Places that are dependent on the tourist trade, such as restaurants, markets and shops would have been influenced too.

The destruction of structures and infrastructures like school facilities, medical equipment, roads, communication networks and water supplies (OCHA Reports 9 &
17, 2000), will result in a state’s unnecessary expenditure to repair or replace what has been lost. Again, instead of using resources to enhance what they already had, resources would have to be used to restore important structures and infrastructures to their former condition. It is then possible that the following will occur in the cycle of development.

**Figure 34.** Cycle of compromised development.

![Diagram of the cycle of compromised development]


A nation that is under pressure and battling to keep abreast of its current economic situation will simply be pushed into a further downward spiral after enduring the effects of a catastrophe. As illustrated in the above diagramme, a country that has limited resources and has to replace and/or repair built structures and other infrastructures will not have much resources left over to address other needs, leading to a delay in the development process of the country. This lack of development will again present the country with a situation that can result in very limited available resources, as an effect of the postponement in development. At the same time, the country may find that their debt increases due to the economic assistance obtained from other nations or international institutions. For example, 20% of the aid that Mozambique received from donors between 1995 and 2004 was in the form of loans.
that amounted to US$ 2, 1 billion (de Renzio & Hanlon, 2007:3). Jubilee Zambia and Oxfam (2001:1) also found that Zambia had an external debt in 2000, amounting to US$ 6.3 billion. They further noted that external debt was the chief cause of escalating poverty in the country. Zambia’s debt kept growing each year (even though the debt was serviced) because of the huge interest thereon, robbing expenditure on key sectors such as health and education. Worst of all, in order to repay these loans the country had to rely on external funding, which only pushed Zambia even further into debt (Jubilee Zambia & Oxfam, 2001:1).

In the 2000 flood disaster, Mozambique lost 450 tons of fish products that were to be exported. This loss amounted to an equivalent of approximately US$ 36 million, in export revenue (UNDP, 2000:36). Clearly, such a tremendous loss would have a resultant negative impact on the fishing industry, as well as the national economy. If other goods and products that were set aside for export were lost to flooding (or other disasters) in the same year, then the total loss could quickly amount to hundreds of millions of US$. Such a big drop in export revenue can set a developing country (that depends upon the export market) back with regards to its economy and in turn development.

With less available finances in the national budget, there will be subsequently less available resources to invest in:

i. development projects and programmes that are aimed at uplifting a society (e.g. poverty reduction programmes or primary health care services), or

ii. fields that require attention and enhancement (e.g. education, research or agriculture).

e) Impact of flooding on health and wellbeing
Polluted water sources and damaged sanitation systems encourage the spread of water borne diseases like diarrhoea and cholera. For example, in Mozambique during the 2000 flooding, the number of acute diarrhoea cases increased from 56 in the first week, to 1,258 cases in the last week of March (OCHA Report 24, 2000). These kinds of diseases, as well as others, can disturb an individual’s nutritional intake. The appetite may become suppressed, they may be too weak to prepare food or the digestion and absorption processes could be disrupted, thus not allowing an
individual to benefit from the nutrients that they need in order to recover. Hence, even if an individual does have access to food, they may not be able to take full advantage of its health giving properties. At the same time, such diseased states may render a person too weak to undertake activities that can earn them the money needed to purchase food.

Another aggravating factor is that people often hold the belief that if they are suffering from diarrhoea or vomiting then they should avoid eating and drinking. This is a false belief. During times of digestive disturbances, the body actually requires the replacement of nutrients and fluids that are being lost. This would help to prevent dehydration and it would also provide the cells with the necessary energy to help the body recover speedily (Burgess & Glasauer, 2004:82 & 83). So, for those who actually cease eating and drinking when they are ill, it merely serves to worsen their health situation, leading to further weakness and illness. In addition, those who are more concerned with their other needs (e.g. finding shelter) may not take heed of their nutritional requirements, thereby making themselves more susceptible to malnourishment and dehydration.

The unhealthy conditions encountered in overcrowded shelters and accommodation centres can also quickly spread diseases to people who may have had a generally healthy state (OCHA Report 9, 2007). Diseases and illnesses like tuberculosis and measles are contagious, and can spread rapidly within a shelter if left untreated. Malaria on the other hand, requires that an individual is protected from mosquito bites that can lead to the illness. Therefore, an individual requires the proper materials and means that will help to protect them from bites, such as mosquito nets or insect repellent body creams. Such prophylactic procedures can be combined with anti-malaria medication to increase its effectiveness. Either way, whether the aim is to treat and contain the spread of a disease, or to prevent a diseased state from arising, the necessary resources (e.g. medicines and Indoor Residual Spray) are required. Without the money to purchase these goods, people would not have access to these necessities. The importance of the authorities’ involvement in providing these resources, in the form of relief aid for a population that is unable to take care of itself, is therefore emphasised (OCHA Report 8, 2007).
Other conditions or circumstances, that could affect the health and wellbeing of a population during a flood disaster, are depicted in figure 35. In turn, these difficulties can go on to affect issues related to food security. For example, someone who is injured by a landmine would not be able to work, or engage in sourcing food. Children who are unaccompanied in an accommodation centre could have their rations of food stolen from them by other adults.

**Figure 35. Conditions affecting the health and wellbeing of people.**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead animals and human corpses that surface as the flood waters recede</td>
<td>• decaying animal and human matter can give rise to micro-organisms and bacteria which give result in disease. • diseases can spread through polluted water flood waters, infecting healthy people and animals.</td>
</tr>
<tr>
<td>Unaccompanied children</td>
<td>• unaccompanied children in accommodation centres increases their vulnerability for abuse.</td>
</tr>
<tr>
<td>Diving into flood waters to save crops and other possessions</td>
<td>• diving into flood waters increases the risk of injury or death from dangerous objects (e.g. sharp bits of metal from tools or buildings) or from crocodile attacks. • increases the likelihood of contracting a water borne disease.</td>
</tr>
<tr>
<td>Continued activity or existence on flood plains</td>
<td>• people who remain on flood plains place themselves in danger of future flooding. • they also risk losing whatever possessions they may still have.</td>
</tr>
<tr>
<td>The movement of landmines to non-mined areas</td>
<td>• when landmines are moved to non-mined areas, people’s safety is threatened.</td>
</tr>
</tbody>
</table>


f) **Impact of flooding on society**

Eight hundred people were killed in the Mozambican flooding of 2000 (Appendix 1). No further details were provided about their demographic traits (e.g. age and gender) or where they were from (e.g. whether all the deaths occurred in a particular province or whether they were spread over the whole country). Without such information, it is difficult to make a proper judgement of how these deaths affected the Mozambican society. In spite of this lack of detail, it can be said that with so many deaths caused by the flooding, it could have the following impacts on a society.
Figure 36. Examples of the impact of a large number of deaths on a society.

<table>
<thead>
<tr>
<th>Large number of deaths caused by flooding can result in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- more vulnerable households as breadwinners are lost</td>
</tr>
<tr>
<td>- increased number of orphaned children or single-headed households</td>
</tr>
<tr>
<td>- loss of future generations if the child mortality rates are high</td>
</tr>
<tr>
<td>- loss of skilled labour/workforce</td>
</tr>
</tbody>
</table>

Source: Adapted from The World Bank, 1997.

As seen in the above figure, a large number of untimely deaths can result in the loss of breadwinners leading to single parent- or child-headed households. This in turn means that these households would become increasingly vulnerable and also lose their ability to provide for their basic needs and ensure a secure existence. Food security would therefore become one of the areas that would be affected under such circumstances. The loss of skilled labour can also take its toll on the economy of a community or society, and likewise can the loss of future generations negatively impact a community’s or society’s destiny. In the case of the latter, when future generations are compromised, then it could result in a lack of available people to take care of those who will grow old in future. Even though the effects of a large death toll may not be easily visible at its onset, the impact which it has on society in the later years can be quite significant.

The destruction and displacement which goes hand in hand with a major flooding event can also render vulnerable groups (e.g. the elderly, women and children) even more vulnerable. For example, in the Mozambican flooding of 2007, a total of 80 police officers were deployed to accommodation centres to assist with protection duties (OCHA Report 13, 2007). As stated in OCHA Report 8 (2007), 50 police officers were trained on gender based violence issues, in Zambezia. The OCHA Report 13 (2000) further reported that various partners, as well as the residents of accommodation centres, were trained on child and women protection as well as sexual exploitation issues. These examples highlight the increased vulnerability of women and children during times of disaster and displacement.
Perhaps even more problematic for a society, because of its range of consequences, is the emergence of internal conflict as a result of the food shortages that are experienced during a disaster. This conflict can arise between minority groups (e.g. ethnic or religious minorities), causing political instability and more hardship, as people fight over the few available resources that might be present (Brown, 2004:23-26). In such cases, the importance of good governance in maintaining peace, and appropriate management in providing for everyone’s needs, becomes critical for the welfare of the entire nation.

An important consideration in the Zambian 2007 flooding event is that it did not follow the usual patterns, and consequently arrived quite unexpectedly. The following examples highlight the unpredictability of weather events that may be associated with climate change.

i. Seasonal flooding in the Western province is common and residents of this area therefore possess an awareness of, and coping strategies for, flooding. However, the 2007 flooding arrived earlier than normal and the population were therefore unprepared.

ii. The rural people residing along the Zambezi River are accustomed to migrating to higher grounds in April, but were caught by surprise when the floods arrived early this year.

iii. Flooding is uncommon in the North-Western province and Luangwa River districts and people have therefore not developed traditional coping strategies for such extreme weather events (CAP, 2007:3).

A population may suddenly find that they are left unprepared when unforeseen circumstances, such as the unpredictability in the weather patterns, disturb their normal routine. Or they may be unsure about the action to take, because they have never experienced a particular weather phenomenon before. Both instances do, however, point to the importance of leaders and experts in the government and other national institutions. These are the few within a population who would (or at least should) have access to knowledge and skills required for handling such situations. The responsibility therefore falls onto those who possess the knowledge and skills to inform and educate the rest of the population, so that severe weather events do not
occur completely unexpectedly. The role of these institutions will therefore be examined in more depth in the following paragraphs.

A rather great concern about this flooding event though, is that according to Martin et al. (2001/2002:26 & 27), accurate records were not kept and the affected population may have been largely underestimated. If this is indeed the case, then the flooding may have had an even greater impact on the population than what was originally believed. This occurrence can be linked to the discussion in the literature review (page 32) that revealed that events are often unreported, under-reported or inaccurately reported.

6.2. Local and international management and intervention

The previous discussion has examined the direct and indirect impacts of flooding on food security. Equally important, if not even more so, is the role of national and international institutions in a population’s experience of an extreme weather event and the consequent food insecurity that is likely to stem from these disasters. How institutions and agencies choose to handle the situation before, during and after a catastrophic event can determine the population’s experience of protection during, and recovery from, an extreme weather disaster.

a) 2000 flooding in Mozambique and Zambia

The Zambian authorities received criticism about the country’s flooding in 2000. The decision to open Kariba dam’s floodgates was described as an action that had no consideration for the subsistence farmers further along the river, as they received little or no warning. The BBC (2000) reported that there were no established policies or actions for disaster preparedness or risk reduction strategies.

According to the BBC (2000), the population in the Lower Zambezi region would have starved if they did not receive food aid. There was however no details about whether or not the population actually received food aid. The only mention about any kind of assistance referred to the seed supplies which were purchased locally for redistribution to the affected population (Mpofu, 2000:30-33). This was a very generous gesture, but the question surrounding immediate food requirements remain
a mystery, as no information relating to this need was found in the consulted documents. The seeds would only benefit the population after some months, after planting is resumed, so it is uncertain how they coped with food insecurity issues in the interim.

Whether Zambia’s aims were to prevent a larger catastrophe, or save the Kariba dam because it is an important hydro-electricity supplier to Zambia and Zimbabwe, it does not justify the authorities’ apparent lack of responsibility towards the affected population, before and after the event. The Zambian government was also under scrutiny because of the US$ 1 million it donated to its neighbour Mozambique, while no assistance had yet been provided to its own people (BBC, 2000). The absence of information regarding the Zambian flooding of 2000 is a possible indication of the lack of interest in the flooding that had occurred, or the lack of assistance given to the affected population.

As already stated, the Mozambican flood disaster of 2000 was experienced with such great magnitude and destruction that it could not be overlooked by the government or the international body. The seriousness of this catastrophe can be illustrated in the fact that many countries battling with their own crises, came forth to assist Mozambique. For example, one of the region’s poorest countries, namely Malawi, responded to the plight of Mozambique and donated 50 tons of maize and the services of two helicopters for rescue operations (Thompson, Bentsi-Enchill & Harsch, 2000). Another neighbouring country, namely South Africa, played a critical role in assisting Mozambique with rescue missions, by providing the services of the SANDF (OCHA Report 11 & 12, 2000). However, it should be observed that the international (i.e. Western) community received much criticism for their delayed reaction to this crisis (Thompson, et al. 2000; OCHA & Integrated Regional Information Networks (IRIN), 2000 and Slaughter, 2000).

Even though the Western community may have been slow to react to Mozambique’s plight, they did however provide tremendous support in various forms. Figure 37 lists some of the examples of assistance that was provided by the international community. Unlike in Zambia in 2000, where the population appeared to have received no food assistance from the government or NGOs, the Mozambican
authorities together with the assistance of international organisations (e.g. WFP) delivered thousands of tons of food to the affected populations (OCHA Reports 12-16, 2000). The provision of food appeared to have been a high priority of the institutions involved in the relief operations. Subsequently, people’s access to this basic human need was secured and starvation was prevented.

**Figure 37.** Examples of assistance provided by the international community during the Mozambican flooding of 2000.

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Examples of assistance provided by the international community

- Millions of US$ in cash donations
- Provision of medical staff & technicians
- Co-ordination & management services
- Donations of various other items (e.g. plastic sheeting, food, blankets, medicines)
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The INGC acted quickly and prepared a bulletin right at the onset of the disaster, so that international institutions could be informed about the situation in Mozambique (OCHA Report 1, 2000). The INGC, together with various government ministries, FAO, WFP and USAID as well as other organisations, undertook assessments early in the catastrophe in preparation for the donor meeting (OCHA Report 2, 2000). These very valuable organisations should have thus been well informed about the country’s status in relation to the disaster, right at the start of events. Hence, there was no need for a ‘delayed reaction’, apart from the probability that they may not have placed this situation as a high enough priority.

Already in the beginning of February, besides ongoing relief and humanitarian operations, the government and other development agencies were exploring rehabilitation or development projects (OCHA Report 5, 2000). Their early consideration of the development issues that arose was particularly necessary to assist the population in recovering quickly from the disaster. In spite of Mozambique’s seemingly appropriate attitude towards post-disaster strategies and procedures, there appears to have been a great lack in early warning activities. Even though some warnings may have been issued (e.g. OCHA Report 21 (2000) revealed that
the government warned populations not to return to Xai-Xai and Chokwe at the end of March), there did not appear to have been warnings issued during the torrential rains or prior to the cyclones striking the country. The OCHA report written in August, did however, mention that a meeting recommended the development of a new warning system (OCHA Report 29, 2000). Recognition of the need for an improved warning system was established too late though, as the country had already been ravaged by extreme weather. This system could, however, serve to mitigate future disasters if the authorities and other partners had arranged for its implementation as soon as possible.

In the above instance, the chances are very high that the authorities knew about the approaching extreme weather, well in advance. Like in 2005, with Hurricane Katrina that struck New Orleans, officials knew about its approach. Even though the Governor of Louisiana declared a state of emergency, there were no definite strategies in place to deal with the approaching catastrophic events. Apart from the fact that warnings were issued quite late, no arrangements were made to offer transport to those who did not have transportation means, so that they could be evacuated from the path of destruction (Marianti, 2007:31). What the New Orleans example highlights, is that in a developed country, where there are technological, man-power and financial resources to deal with a crisis, the authorities attitudes toward the disaster were rather relaxed. In developing countries, like Mozambique and Zambia, that do not have access to many of these necessary resources, the difficulty of the situation is compounded tremendously. Even if the lack of resources is to blame, the authorities’ response to the approaching disaster in Mozambique is inexcusable though. The above example also illustrates that it is not only the developing world that may experience such a lack of responsibility by governments to their people, but that it also occurs in the more developed West.

The established OSOCC office provided a necessary coordination of the key agencies and their respective functions (OCHA Report 7, 2000). The regular meetings and conferences throughout 2000, between the Mozambican authorities and various international institutions (OCHA Reports 2, 3, 7, 8, 13, 17, 18, 19, 22, 27 & 28, 2000) were extremely important for coordination efforts and for sourcing donor assistance. However, as necessary and beneficial as what these meetings were, a
great danger lies in the fact that often it is only “... experts talking to experts” (Shah, 2008:119). What Shah is referring to, is the occurrence where people of similar academic and professional backgrounds engage in dialogue, while others (e.g. traditional community leaders) are excluded (Shah, 2008:119). In incidences such as these, the voices of the people who are actually affected by a particular situation (i.e. on a grassroots level) are left unheard. As a result, what the affected population actually wants or needs, may pass unnoticed. This is quite an earnest matter, because for any programme or project to be effective, it needs to address the actual needs and issues of the population, and not simply what others in leadership roles may assume or deem to be required.

Shah (2008:119) further suggests that another threat to assistance programmes is that the original proposals and aims may be abandoned and that the meetings and conferences merely become an “... end in itself”. This does not appear to have occurred during flooding of 2000 in Mozambique, though. The outcomes of the meetings that were held (e.g. the large sums of financial donations that were pledged) create the impression that these meetings were indeed constructive and that they achieved what they had set out to accomplish.

Evaluation appeared to be ongoing, throughout the crisis (OCHA Reports 9, 13, 15, 16 & 17, 2000). This is an important process in any disaster management programme, because constant criticism and judgement of the accomplishments, pitfalls and gaps in the programme need to be established, so that a future plan of action can be determined. Also, like in Mozambique in 2000, where the country first experienced heavy torrential rains and then was later struck by a cyclone (OCHA Reports 1 & 9, 2000), the original needs that were established could quickly change to include others that were perhaps not considered at first. In such cases, relief and assistance operations would need to be altered to include the areas that require attention. Without evaluation, the authorities and institutions that are involved would not be able to provide the most fitting interventions.

Despite the seemingly appropriate coordination and management of the situation, the lack of response by donors to livestock problems posed an increasing concern in the agricultural sector (OCHA Report 24, 2000). Livestock provides a valuable food
source to many households, and the loss of livestock to drowning or diseases brought about by flooding would therefore impact a large number of them. Hence, it is only most appropriate to introduce disease prevention strategies, such as vaccinations, in order to protect livestock numbers. Yet, there was no evidence in the reports, that institutions (e.g. FAO and the Ministry of Agriculture) were actually engaged in livestock protection programmes. Veterinary kits were distributed though (OCHA Report 17, 2000), but if the people to whom these kits were distributed did not have proper knowledge about how they should administer the medicines or vaccinations, it would not have been of much benefit. In addition, seeds, fertiliser and tools were distributed to the affected population (OCHA Report 17, 2000). These agricultural kits are extremely helpful in assisting a population to resume their farming activities, thereby helping them to restore their future food security.

The 2000 flood disaster pushed the Mozambican and international community’s disaster management skills to the maximum. Regardless of the flaws and deficiencies that may have been encountered, they appeared to have managed this disaster in an appropriate manner. In comparison to the Zambian disaster, the Mozambican authorities were far more attentive and responsive to the situation. As a result, the Mozambican population’s food security status was protected as best as it could be, during and after this difficult time, thereby allowing the affected population time to recover and regain their self-sufficiency.

b) 2007 flooding in Mozambique
The 2007 flooding in Mozambique occurred on a smaller scale than the disaster in 2000, but it was still large enough to impact the affected population significantly. The Mozambican government, and other agencies, appeared to be even more vigilant during this flood disaster than they were in 2000.

As was the case in 2000, the Mozambican government received assistance from UN agencies and other local and international organisations as well as donations amounting to millions of US$ in support of relief operations. In addition to the kind of items that were also provided in the 2000 disaster (e.g. blankets, plastic, latrines, cooking utensils, and so forth), the 2007 flooding in Mozambique also saw the donation and provision of thousands of school kits and learning materials (OCHA
Reports 7 & 12, 2007). There was a much bigger emphasis on education (ranging from primary school to health education), during this disaster (OCHA Report 11, 2007). Furthermore, actions that were not undertaken in 2000 were implemented in 2007. Figure 38 lists these actions and strategies that were introduced in 2007.

**Figure 38.** Examples of actions and strategies that were employed during the 2007 flood disaster in Mozambique.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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| **Protection**      | • police officers were deployed to accommodation centres to assist with the protection of women and children.  
                     • various actors were trained in sexual exploitation issues. |
| **Education**       | • community theatre groups and DVD projections provided health promotion education.  
                     • distribution of educational and recreational materials to affected schools. |
| **Psycho-social support** | • psycho-social support was provided to vulnerable groups in accommodation centres.  
                              • activists were trained to provide psycho-social support. |


The introduction of new actions and methods indicates that lessons learnt from the previous flooding event were identified and addressed in the later event. Such an approach was absolutely necessary in order to overcome repeated shortcomings and complications, thereby assisting the population in the coping and recovery phases. It therefore appeared from the consulted reports that Mozambique had advanced in this respect.

The government also appeared to exercise a more serious approach regarding the 2007 flooding and its consequences. For example, the Prime Minister authorised the forcible evacuation of those threatened by floods, but who were refusing to leave their land (OCHA Report 2, 2007). In 2000, on the other hand, many people chose to remain stranded on roof tops as they waited for the flood waters to recede. As in 2000, meetings were held regularly in 2007 to coordinate and manage responses (OCHA Report 2, 2007). In addition, various approaches and offices were established.
to improve the management and coordination of activities. These new management/coordination authorities or activities, that were not present in 2007, included the Interagency Map Centre, a second phase radio room that could be used by all the organisations providing assistance, and the cluster approach (OCHA Reports 5, 6 & 10, 2007). Accordingly, the systematic and proper execution of duties and responsibilities were carried out.

Another interesting advancement was that during the 2007 disaster, the Mozambican and Zambian water authorities made a concerted effort to coordinate the release of water from their dams into the Zambezi River, in an attempt to lessen flooding downstream (OCHA Report 2, 2007). Details of such cooperation was not found in the 2000 reports, so this was a refreshing attempt, by both countries, to protect the populations and areas that could be affected by the Zambezi River’s flooding.

Other efforts, that were not employed in 2000 but which were encouraged in the 2007 flooding, included boosting local involvement in the building of shelters and latrines (OCHA Report 12, 2007). This was done by providing the necessary tools for undertaking these tasks. Community participation in projects like those just mentioned, means that some of the responsibility is handed over to the local people thereby allowing the government and other agencies to concentrate on more pressing issues. The same can be said of food-for-work programmes, for example. Similarly, members of the population can contribute to rebuilding their communities, while receiving food in return for their efforts.

The widespread devastation caused by the 2007 flooding, like in the 2000 disaster, displaced large numbers of people who had to be housed in temporary shelters and accommodation centres (OCHA Reports 1-5 & 7-9, 2007). In this instance though, the authorities recognised that continuous monitoring and registering of the populations in the accommodation centres was necessary to avoid overcrowding and other complications (OCHA Report 11, 2007). Even when the floods had subsided, some camps were reporting a continuous influx of people. This was attributed to food shortages in the rural areas, and the availability of food at the accommodation centres. This occurrence emphasised the need for improved control over peoples’ movement in these centres. It was further recognised that improved registration
processes would facilitate food distribution and the identification of gaps in food and non-food items assistance (OCHA Report 12 & 13, 2007). Besides the importance of proper monitoring and registration, the INGC acknowledged that the rewards for resettlement should be so appealing that it should motivate people to resettle in new areas, instead of returning to their usual residencies that were in hazardous locations (OCHA Report 13, 2007). The resettlement of people to safer areas plays a major role in reducing the risk of future displacement that is caused by flooding. In this way, people’s livelihoods are protected and they would be able to resume activities that provide sustenance.

As in the flood reports from the 2000 period, there were no details provided about how crop and livestock health were addressed in 2007. Irrespective of this occurrence, an entirely new approach to post-disaster farming assistance was introduced by the FAO, in collaboration with the Ministry of Agriculture and the INGC. The institutions organised Agricultural Input Trade Fairs that were to be held in the 7 provinces of the Zambezi basin (OCHA Report 13, 2007). This action would have supported 57 000 flood affected households. Envisaged to be completed by the end of April, it would have been in time for the beginning of the second agricultural season. The rewards of this intervention was projected to yield about 60 000 tons of food. Figure 39 provides a breakdown of the food that could be produced.

**Figure 39.** Estimated food yields after the 2007 Agricultural Input Trade Fairs in Mozambique.

- Estimated outputs = 16 000 tons of maize + 6 000 tons of beans + 40 000 tons of various vegetables


The projected yields were fairly substantial and would have contributed to securing the population’s access to food in the months following the disaster. The institutions responsible for the trade fairs had thus initiated a very important process.
Regarding the issuance of early warnings, it was found that at an early stage in the 2007 flooding, the Mozambican authorities were warning people about the rising waters and the impending dangers, urging them to move to higher ground (OCHA Reports 1 & 2, 2007). Even though some warnings were issued, it did not appear as if the Mozambican authorities were undertaking early warning activities with any amount of urgency. The implementation or use of the early warning system that was recommended to be developed (after the 2000 flood disaster) was not mentioned in the 2007 disaster. It therefore remains unclear as to whether this system was actually developed, and whether or not it was utilised in 2007. If it was, the Mozambican’s early warning activities still appear much too weak for a country that is regularly battered by tropical cyclones and storms.

The recognition of an urgent need for expertise and knowledge that could be applied to, or incorporated into, the rebuilding of structures while keeping cyclone risk factors in mind, arose in 2007 (IFRC, 2007:6). It was also acknowledged that there was a shortage in the circulation of information and in capacity building that focused on cyclone preventative measures, within the affected population (OCHA Report 10, 2007). Without the correct risk reduction knowledge, information and strategies, a population would not be able to protect themselves, avoid a catastrophe and secure themselves against similar extreme weather events in future. For example, after a disaster and without the correct information and knowledge, people would continue to repair and rebuild their houses in exactly the same manner as what they did before, which would lead to the exact same consequences after similar weather conditions in future.

Save the Children’s production and distribution of 200 000 leaflets covering the topic of cyclone preparedness, in conjunction with the INGC, was an important mitigation strategy (OCHA Report 10, 2007). Importantly, they produced these leaflets in the local languages, so that it could be understood by the affected populations. However, even though this strategy is highly beneficial, this particular intervention design is likely to be useless to the illiterate population. Instead, they should have perhaps explored a strategy that could be of benefit to both the literate and illiterate populations (e.g. radio broadcasts in the local languages or a DVD production).
Nonetheless, these “... what to do when disaster strikes” brochures were a vital first step in the disaster risk reduction process (OCHA Report 12, 2007).

In addition to equipping the population with disaster risk reduction strategies that can be incorporated into their building techniques, landmine risk education and training was also carried out (OCHA Report 11, 2007). This was extremely important because flood waters had moved landmines to areas that were previously landmine free, posing a new risk for the population.

c) 2007 flooding in Zambia
The Zambian flooding of 2007 occurred on a scale that required prompt attention. Unlike the 2000 event, it was widespread and affected more than 1.5 million people. Zambia, like Mozambique in 2000 and 2007, experienced the disruption and/or destruction of various structures and infrastructures (e.g. roads, schools, water supplies, healthcare delivery) in this flood disaster. Therefore, the authorities could not ignore the catastrophic conditions that had occurred.

According to CAP (2007:8), the Zambian government had taken a leadership role in the 2007 flood response and the affected communities exhibited a capacity to recover quickly. They attributed these reactions to the international community’s support of disaster management capacity building in Zambia, during recent years. The government of Zambia, directed by the DMMU, led the flood relief operations of 2007 and provided for the populations basic human needs (e.g. food, water and shelter). Based on the findings of the VAC assessment, the government (like their Mozambican counterparts) had requested assistance from the international community (CAP, 2007:1). A sector approach, as illustrated in the following figure, had also been undertaken in Zambia.
The sector approach appeared to have assisted immensely in the management of the disaster. Similarly to Mozambique, the Zambian authorities (together with its partners) also addressed:

- health care needs and hygiene promotion,
- supplementary feeding needs for the malnourished,
- psycho-social support to children, and the
- provision and distribution of learning and teaching materials.

Unlike Mozambique though, Zambia appeared to have neglected:

- HIV/AIDS education,
- education and training on gender based violence, and
- the protection of vulnerable groups (e.g. women) in accommodation centres.

Despite a brief mention of an intervention aimed at preventing the spread of sexually transmitted diseases, including HIV, in the CAP (2007:11) report, it appears too feeble in the light of Zambia's HIV/AIDS epidemic. More robust and proactive HIV/AIDS education and intervention initiatives should be operational if it is to have any positive impact on the society. This provides a fitting example of an institution and its partners that are simply not doing enough to address the HIV/AIDS dilemma. In Mozambique, for example, HIV/AIDS education was given at accommodation centres, where large numbers of people were gathered. Zambia could have utilised the same strategy in the 2007 flood disaster, as their accommodation centres also
provided refuge to large numbers of people. If the HIV/AIDS pandemic (which is also hindering human development) is to be addressed and brought under control in Zambia, then the country definitely needs to improve on its intervention strategies. The light-hearted approach which appears to have been implemented in the 2007 disaster is not a strategy that would accomplish much success in the fight against HIV/AIDS in Zambia.

The CAP report (2007:15) mentions that protection was provided for children that were affected by the floods, but there is no mention of the education and training that was provided for populations on topics dealing with gender-based issues or violence against women and children. Neither is there any mention of protection services operating in the accommodation centres, where women and children are probably most vulnerable. Like the HIV/AIDS issues, these too are important areas requiring attention. It thus appears as if Zambia could learn much from Mozambique’s approach to overall social interventions during the disaster management phase.

Unlike the reports governing the Mozambican flood disasters, the consulted reports for the Zambian flooding did not list the foreign countries that had pledged financial or other donations. Instead, the majority of the donors listed were UN agencies (e.g. UNICEF, WFP and UNDP), and a few other organisations like Oxfam and Concern World Wide (CAP, 2007:2 and ZVAC, 2008:3). The relief operations were basically handled by the Zambian authorities and the international NGOs. It is therefore unclear whether Zambia had in fact received direct assistance from other African countries, or the Western community, or whether the only assistance received was from the NGOs that were involved in the assistance programmes.

If it is indeed the case that Zambia had not received any aid directly from other nations, then this could possibly point to strained relations between Zambia and the international community. There was however, no clear cut evidence that such a problem did exist either. On the other hand, perhaps the Western nations had not realised the seriousness of the 2007 disaster in Zambia, or perhaps Zambia was too proud a nation to let their plight be known. As the Environmental and Societal Impacts Group (ESIG) (2004) point out that sometimes a government does not want their past (or current) experiences to be exposed to the public (or other nations), as
this would highlight both their strengths and weaknesses. Then again, maybe Zambia has indeed stepped up their disaster management capacity, as noted by CAP (2007:8), and therefore does not need as much assistance from the outside. Too much room for speculation exists though, due to the lack of information surrounding this issue, and a definitive conclusion as to why there was no direct involvement from other countries cannot be based solely on the consulted reports.

Even though Zambia had many shortcomings in their management of the 2007 disaster, and its corresponding areas, the institutions involved in providing assistance regularly carried out assessments and evaluations (CAP, 2007). These evaluations, as stated in an earlier discussion, are crucial in revising approaches and identifying new areas that require attention.

Regarding food security, the Zambian government apparently had enough food to assist the population at the onset of the disaster and a re-assessment of the emergency food needs was scheduled for May 2007 (i.e. roughly two months after the start of the flooding) (CAP, 2007:5). This indicated that Zambia had enough food stores to take care of the population’s needs during the catastrophe. It also showed that all the food stores were not destroyed either. The availability of food in Zambia could be viewed as a positive accomplishment by the country, because it would appear that careful management and planning was utilised, enabling Zambia to hold a reserve food stock. As a result, Zambia did not have to wait on external donors for food assistance, and could immediately attend to the needs of their population.

Contrary to the anticipated increase in food prices during and after a disaster, the maize prices remained fairly low in both rural and urban areas, during the 2007/2008 marketing season. This was attributed to the above normal harvest of 2006/2007. The prices in most areas only started to rise in December 2007. Usually, it begins rising by September when the stocks at the household level starts to deplete. This price pattern for 2007/2008 confirms the good grain supply on the market (ZVAC, 2008:10 & 11). Zambia’s crop surplus of 250 000 tons (irrespective of the flooding) is probably what made the government over confident in the country’s situation, leading to the export of maize during this critical period. Kabanda, a spokesman for a civic advocacy group, was quoted in IRIN (2007) stating that,
“We are very sad indeed that despite the forecast our government has continued to export maize, without first stockpiling for the local needs, as some people might be rendered vulnerable in just a few months”.

The reasons for the government’s actions were not found though. Their approach does, however, echo aspects of the discussion in the literature review that briefly examines the financial greed that might drive decisions relating to food products. On the contrary, though, Zambia had enough food stores to take care of their population’s immediate needs, but still the population would have required assistance for some months after the flooding until such a time when they could become self-sufficient again.

The FAO, together with other institutions, worked towards the implementation of various agricultural programmes. The livestock protection programme was aimed at the veterinary treatment of nearly 500 000 cattle, in order to protect cattle numbers so that the affected households could maintain their asset base (CAP, 2007:16). The FAO also provided agricultural support to about 140 000 households. The support included providing agricultural materials (e.g. seeds, treadle pumps and fertiliser), as well as training in irrigation techniques. Rescue and collection missions of valuable traditional crop species and germplasms were also led by the FAO. All these agricultural interventions helped the population to recover from the disaster so that their food security status may be quickly restored.

6.3. Conclusion to discussion of results

The relationship between climate change and flooding has emerged as being of such a complex nature that it requires more expert knowledge for further investigation. The most important deduction made about this relationship though, is that climate change is indeed increasing the frequency and intensity of extreme weather events like flooding. An understanding of the connection between flooding and food security becomes an important topic, as food security is increasingly being threatened by these periods of extreme weather.

However, the above discussion has also revealed that it is not merely climate extremes (e.g. flooding) that have an impact on a population’s food security, but also
the complexities of other aspects of the social world that influence how a population experiences food access and availability. Using Mozambique and Zambia as a point of reference, the discussion of the impacts of flooding in relation to food security, examined how flooding affects various dimensions within a society (e.g. economy, infrastructure, agriculture) and how its effect on these dimensions in turn influence a population’s food security. The losses and impacts experienced during a flood disaster are numerous and have only been briefly examined in the above discussion. The adversity that society endures as a result of flooding can be summarised in the following diagramme.
Figure 41. Classification of disaster losses.

DISASTER LOSSES

TANGIBLE (market values)

DIRECT
- contents of main buildings

INTERNAL

EXTERNAL
- external items e.g. vehicles, boats
- contents of out buildings, sheds

STRUCTURAL
- cleaning & repair e.g. buildings, infrastructure

CLEANUP
- immediate removal of debris & discarded items

INDIRECT
- loss of production or revenue
- reduced wages
- extra expenditure

FINANCIAL

OPPORTUNITY
- the non-provision of public services

INTANGIBLE (non-market values)

DIRECT

DEATH & INJURY
- cultural icons
- personal memorabilia
- environmental

INCONVENIENCE & DISRUPTION
- social life
- schooling

STRESS
- depression
- ill health
- marital stress

INDIRECT

LOSS OF SIGNIFICANT ITEMS

Even though flooding is a very destructive natural phenomenon, many of its consequences are related to man’s involvement or influence throughout the process leading to, and resulting from, a flood event. For example, man’s influence in the environment (e.g. changing ground cover by building roads and parking lots) can result in more intense flooding effects and therefore more destruction. In the same manner, a country’s absence of early warning information can render a population extremely vulnerable to the occurrence of a flood as they would not have had an opportunity to undertake protective measures, like moving to higher ground. Hence, the role of national and international institutions in the management and intervention of flood disasters arose as a pertinent subject. The strategies and policies employed by governments and other agencies have important implications for the population, and their recovery. The actions of these institutions greatly determine whether or not a population is protected from future food insecurity that may have resulted from the flooding. Generally, a population is entirely dependent on these institutions in times of disaster because they do not have their own resources on which to fall back on, indicating the need for development capacity building on a local level. Especially in countries like Mozambique and Zambia, where the majority of the population is made vulnerable by poverty, there are no personal or household resources on which the population can rely.

The 2000 and 2007 flood disasters in Mozambique were so significant that it had to be addressed by the government and the international community. The population was left in dire need after these flood events, as their possessions, homes, crops and livestock, amongst other things, were destroyed. Without assistance from the government or other institutions, the population would have slowly perished from hunger and disease.

In both disasters, Mozambique, with the assistance of international institutions, responded to the population’s basic human needs. The operations were chiefly aimed at rescuing people and providing food, water and shelter to those affected. In addition to providing for the population’s basic needs, Mozambique and its partners introduced other intervention strategies (e.g. supplementary feeding, health care and education initiatives). Mozambique appeared to have taken heed of the shortcomings in response to the 2000 disaster, and as a result had introduced certain strategies
and policies during the 2007 disaster. Mozambique’s performance during the disasters was satisfactory, and the country showed that it was eager to improve on its approaches.

Despite Mozambique’s acceptable response during the disaster, it appeared as if the country was not doing enough to protect its population before disaster strikes. Even though some early warnings were issued during the 2007 flood event, it lacked substance and a sense of urgency. Disaster preparedness thus surfaced as a matter that required more attention (Martin, et al. 2001/2002:28-32). The INGC and Save the Children began a campaign aimed at educating the population on what to do in order to protect themselves (especially their homes) against future cyclone activity, but this programme was only geared towards producing and distributing 200 000 leaflets. The programme was clearly inadequate of reaching Mozambique’s entire population. The lack of attention to livestock health was also identified as a neglected area. In total, the attention given to agricultural issues could also be vastly improved, so that the population is supported in recovering their former food production activities.

In comparison to Mozambique, the Zambian authorities exhibited a complete lack of responsibility and regard toward their population in 2000. With virtually no warning, they opened the Kariba Dam’s floodgates and unleashed waters that led to the destruction of crops that would have fed thousands in the region. Neither could any information about their support to the affected communities, after the flooding, be found in the consulted reports. Zambia’s management of the event, before, during and after its occurrence was clearly unacceptable and one could even say that it was a violation of this population’s right to protection and security.

The 2007 flooding in Zambia was more destructive and widespread than the disaster in 2000. As a result, the Zambian authorities managed it in a very different manner. This improved approach was, however, also attributed to the international interventions in the country’s disaster preparedness capacity building. Even though Zambia, with the assistance of international institutions, managed the 2007 disaster in a better fashion than the 2000 event, there were still many areas of inadequacy. When compared with Mozambique, Zambia appears to be lagging very far behind in the holistic approach to disaster management (including its corresponding
development aspects) that is necessary for the success of an intervention. Particularly issues relating to the protection of vulnerable groups, HIV/AIDS and gender, were neglected. Apart from being very relevant to a population’s safety and security and health status, these issues also play a significant part in the subject of food security. It was especially surprising that even with Zambia’s tremendous HIV/AIDS problem the country did not choose to focus more on this social dilemma during the 2007 flooding. As discussed in the literature review, it is critical that a country addresses human development in an attempt to enhance the population’s overall security, and particularly their food security. It therefore appears as if Zambia has not yet recognised and acknowledged the connection between development and security.

The only area in which Zambia appeared to have been more efficient than Mozambique was in the attention to, and treatment of, livestock diseases after the flooding. Directed by the FAO, the programme focused on protecting and improving the health status of livestock, so that the population’s assets and food sources could be secured. Just like in Mozambique, cattle form an important part of daily life in the Zambian society by providing food and an asset base, amongst other things, and are therefore worthy of protection.

A striking characteristic of the 2000 and 2007 consulted reports was that they did not reveal how the fishing industry was supported during the flooding. This industry experienced destruction, with the damage of fish camps in Zambia and the loss of tons of fish products in Mozambique. Yet no reference was made to the assistance that this industry received. As discussed in the country profiles, the populations in Mozambique and Zambia are both dependent on fishing as a source of food and as a means of earning an income. The lack of attention to this integral part of Mozambican and Zambian livelihoods is a cause for distress. Mozambique, with its access to the coast, and its great potential for the export of fish products is especially deserving of more support in the fishing industry. In the same manner, even though Zambia is an inland country, its water sources have shown an inherent capacity for growth and development of the fishing industry.
In 2007, Zambia and Mozambique worked together to regulate the flow of water from their dam discharges. As neighbouring countries, such cooperation in mutual affairs is essential. The possibility exists for these countries to learn from each other when it concerns disaster preparedness and management. Also, because these countries are affected by each other’s water sources, it would be most beneficial if they worked together on establishing an early warning system that could benefit both countries. By sharing knowledge and expertise, Mozambique and Zambia could enhance many aspects of development and improve the conditions of the people in the region.
CHAPTER 7: ADAPTATION AND RECOMMENDATIONS

The discussion of results has revealed that it is not merely enough to respond to a disaster and address its consequences. Instead, the effects of a disaster need to be prevented or managed in advance or completely avoided. For example, if more early warnings were issued in Mozambique and Zambia prior to the 2000 and 2007 flood events, then the populations would have had a chance to protect their belongings and/or move to higher ground where they would have been safe. In short, threats that arrive unexpectedly carry far more repercussions than those that are anticipated. Alkire (2003:2) has identified that the principle objective of human security is to protect the core of human subsistence. However, it is very important that this protection is ensured over a period of time. In this way, a steady progress in development can be maintained. The ESIG (2004) point out that even though a hydrometeorological disaster may only take a short time to occur (e.g. hours, days or weeks), the consequences of such an episode can disrupt development in the long-term, resulting in difficulties that can last for years.

In response to the need to protect human existence and the process of development, it has been recognised that adaptation and mitigation are the two key approaches that can be used to deal with climate change (United Nations Framework Convention on Climate Change (UNFCCC), 2008). As large-scale floods become more frequent, major policy-makers are often discussing how to cope with, and adapt to, floods. Hence, certain prevalent tenets have emerged.

Even though every country would have to adapt to climate change, how they choose to adapt and the methods that they utilise, will vary across countries and regions. In order to develop a successful adaptation plan that suits a specific country and population, all the various aspects need to be integrated and a collection of institutions and agencies need to be actively involved in the development of this plan. In order to be successful, the implementation of such a plan requires sufficient and maintained funding. The Adaptation Fund (under the supervision of the Kyoto Protocol), for example, was set up to provide financial support to adaptation projects in developing countries that are also aligned to the Kyoto Protocol (UNFCCC, 2008). Interestingly though, it was discovered that even if people have the resources and
ability to cope with the changing weather, it does not imply that they are any better prepared for adaptation than those who have less means (O’Brien et al., cited in Yamin, 2004:5). This again points to the variable and unpredictable nature of the crises that may arise, and it also signifies the role that governments and other institutions play in this process.

While there is no available prototype for favourable adaptation to climate change, the UNDP (2007:172) hold that “Human development itself is the most secure foundation for adaptation for climate change”. This opinion becomes important in the evidence that, in developing countries, adaptation is largely based on an individual’s ability to do what is necessary for this process (i.e. self-help) whereas, in the more developed countries, governments have the economic, human and technological resources to protect their populations against climate change (UNDP, 2007:171). The UNDP (2007:172) also indicates though, that adaptation to climate change stretches far beyond merely having the right resources or infrastructure. They propose that every aspect of policy planning should include climate change risk assessment, as this forms the basis of the most ideal starting point for addressing adaptation needs. One finds a multitude of adaptation options. Some of which, that were identified by the UNFCCC (2008), includes:

- technological choices (e.g. flood-proof houses),
- management options (e.g. switching crop varieties),
- enhanced risk management and early warning systems,
- conservation (e.g. forest conservation and restoration),
- a change of behaviour at an individual level (e.g. water conservation during drought).

The APFM (2006:21) holds that complete protection from flooding is a false belief. They also indicate that it is neither suitable nor environmentally advisable. Irrespective of the strategies employed to decrease flood hazards, there will invariably be a certain amount of remaining risks. Consequently, flood emergency management (composed of flood preparedness, response and recovery) forms an essential part of the aims to reduce flood hazards. Integrated Flood Management (IFM), which concentrates on the social, physical, economic and environmental
elements of flooding, is therefore an important approach that can be used to address concerns relating to human security and sustainable development from a flood management perspective (APFM, 2006:ix & 21).

Emphasis is usually placed on the destructive nature of floods, but flooding gives rise to both harmful and advantageous effects. In IFM it becomes necessary to view the positive and negative consequences of floods and to regard the flooding of river basins as a natural process, rather than nature’s impeding force on economic development (APFM, 2006:5). Below follows a diagrammatic representation of the estimated number of positive and negative outcomes of the flooding in Mozambique and Zambia. This figure shows though, that even when positive outcomes or effects are experienced, the negative effects are still the most predominant. It also indicates that the positive outcomes of the 2007 flooding event were much higher than those in 2000. The increase in positive outcomes in 2007 can be attributed to better management of the floods, highlighting the important role that good management and planning can have during a disaster.

Figure 42. Estimated number of positive and negative effects from 2000 and 2007 flooding.

7.1. Recommendations

An examination of the recommendations for disasters, particularly flooding, emerges because it forms an integral part of good management practice. Some of the opinions and options pertaining to adaptation, which arose from the research, are thus further investigated. These considerations all help to reduce a population’s vulnerability to the changing climate by protecting their physical safety and by preventing economic and other losses. When communities become less vulnerable to disasters, it automatically has positive implications for development (Murphy, 2005:25-27). Hence, it goes without saying that it is crucial to reduce vulnerability to disasters and protect the livelihoods of the people.

Figure 43. Disaster management cycle

Source: Khan, et al. n.d.:49
The disaster management cycle in figure 43 provides a general overview of the steps that should be taken when dealing with a crisis, as well as where development fits into this process. As indicated in the diagramme, reconstruction and prevention are closely connected to development. What is indicated here is that reconstruction needs to enhance development, which will then go on to prevent a catastrophe. In a way, this sums up the idea of linking relief with development and the concept of sustainable development, as discussed by Buchanan-Smith and Maxwell (1994), the UNDP (1998) and Banuri and Opschoor (2007), amongst others, and explored in the literature review (pages 22 & 64). The UNDP (1998:6) rightly suggests that “Assistance... has to look at capacity building and reinforcing community structures right from the start...”. If this does not occur, then the moment that aid or assistance is withdrawn, people will most likely lose their capacity to protect themselves from future disasters (increasing their vulnerability). The following discussion therefore brings to light these principles that should be considered in adaptation, and more specifically, in the wake of, or to avoid, a flood disaster.

a) Preparedness and risk reduction

The UNDP (2007:182) has identified disaster risk management as an essential component of adaptation planning. Early warning systems, education and public awareness, coordination between the government and other agencies, as well as the constructive participation of interested parties, are very necessary constituents of preparedness planning (APFM, 2006:21). Ideally, disaster risk reduction should be combined into emergency relief and development planning, thereby increasing people’s safety while promoting recovery or progress (Murphy, 2005:27).

Preparedness actions include flood fighting (e.g. sandbagging or building temporary strongholds) in perilous areas and the prevention of other disasters (e.g. landslides) (APFM, 2006:24). Fox (2004:5 & 6), Alam (2008:2) and Pilon (n.d.:8) found that the structural (e.g. embankments) and nonstructural (e.g. flood forecasting) elements of flood risk reduction should be necessary components of the general development process and of flood relief and recovery operations (Pilon, n.d.:18). Isolated flood control however, proved to be inefficient in providing sound, long-term solutions for managing flood hazards. Instead, it can sometimes even exacerbate flood problems when it is not applied in conjunction with the overall policy (Asian Disaster
Preparedness Center (ADPC) cited in Alam, 2008:3). Flood risks can be reduced by decreasing the magnitude of hazards, inhibiting the exposure of people and their activities to flooding and diminishing the vulnerability of flood-prone communities (APFM, 2006:15). Vulnerability to flooding can be reduced through:

i. structural flood protection (e.g. construction of levees or floodwalls),
ii. land use organisation and regulation (e.g. prohibiting settlement in flood-prone areas),
iii. flood emergency procedures (e.g. moving people away from flooded areas) (APFM, 2006:15)

The World Bank, cited in Alam (2008:4), claims that flood-proofing has proved to be effective. Importantly, it can also be incorporated into the flood response actions through cash-for-work schemes (Disasters Emergency Committee (DEC), cited in Alam, 2008:4). Flood-proofing can be applied at the household or community level. This provides the possibility of living with floods and it also facilitates the active participation of communities. Important infrastructures such as schools, community health care facilities, communication channels, water supply sources and buildings used to store emergency supplies, should receive appropriate flood-proofing (APFM, 2006:15). By preventing or mitigating damage to these important structures/infrastructures, it would decrease the likelihood of negatively impacting the development process.

The research did not find any evidence of preparedness or risk reduction strategies (e.g. sandbagging) that was used in Mozambique and Zambia during either the 2000 or 2007 disasters. Had the populations had an opportunity to prepare for, and utilise some of these strategies prior to the flooding, then a large portion of the devastation and loss of life, could have been avoided. Especially with regards to the population’s food security, if they had received sufficient time to prepare (e.g. harvest as much of their crops as they could, pack up their food and belongings, or place their food and seed stores in safer places), then the flooding would not have impacted their food security so greatly.

However, attention should also be drawn to the idea that the cost to reduce risk immediately or in the short-term is very large. According to Shah (2008:118) it is
generally the technical field that has fostered this belief. Even though this may be the case in many instances, Shah (2008:118) points out that there are many other risk reduction strategies that can be used, which do not require a financial investment. An example of such a cost-effective strategy is visible in Mozambique’s response in 2007, when 200 000 pamphlets on cyclone preparedness were to be delivered to a section of the population (OCHA Report 12, 2007). Even though this strategy was not targeted at the entire nation it was, however, an appropriate beginning to a task that required much more attention.

b) Information and early warning
A community becomes better equipped to steer its own course of recovery if it has access to information. Thus, it is imperative that an affected population receives useful information during the emergency and recovery stages (IFRC, cited in Alam, 2008:5). Perhaps of even more importance, is the application of early warning and forecasting which are beneficial to contingency planning and flood response management (Alam, 2008:4 and UNISDR, 2007:45). The ESIG (2004) states that, “An early warning system is an important tool in a government’s toolbox for achieving sustainable development”.

Early warning allows a population enough time to prepare for impending disasters, thus helping them to avoid some of its consequences. Mozambique’s use of radio broadcasts as part of their cholera prevention programme in 2007 is a good example of a technique that can be used to warn a population about an approaching disaster. In Zambia in 2000 for example, the population in the Zambezi River area could have saved some crop produce before the opening of the Kariba dams’ floodgates, if they had received a warning. According to Chigwada (2004) though, Zambia has organised early warning systems that disseminate data timeously so that the effects of a disaster are minimised. However, here he was particularly referring to systems that were relevant to drought, and no mention was given to flooding. This could possibly point to the notion that drought, as an extreme weather phenomenon, receives more attention than flooding, in Zambia.

In comparison to Zambia, Mozambique has a few institutions in place that provide early warnings (e.g. INAM for extreme weather episodes, Regional Water
Administration for flood threats and the National Food Security Early Warning System for food security threats). Unfortunately though, these forecasts are of a rather poor to moderate quality and would need to be improved in order to provide the most benefit (UNDP, 2000:46). Also, if there is a lack of finances and skill, or an absence of proper planning and management, then the goals of these early warning systems would be compromised. The people working within these organisations or departments would be faced with constant restrictions and obstacles to their work, thereby lowering the standard of their assessments and recommendations.

Mozambique had therefore received a weather forecast for the 1999/2000 rainy season which guided the Technical Council for Disaster Management in their plans for the forthcoming rainy season and the accompanying floods and cyclones (UNISDR, 2007:29). Even though the 2000 floods exhausted the Mozambican government’s capacity, the early creation of an emergency response plan assisted them in taking swift action following the flooding. The satisfactory management of the 2000 floods enabled Mozambique to mitigate the later 2001 floods, so that the effects thereof were fairly insignificant (UNISDR, 2007:30). Early warning, predictions and/or timely information therefore proves to be absolutely necessary for the effective management and control of disasters like flooding.

Early warning information, predominantly required by the poor, is of little use if it is not understood or if the recipients do not have the necessary knowledge and skills to take preventative actions (Alam, 2008:4). In order to enhance educational activities and the distribution of information, Chigwada (2004) suggests that women should be encouraged to attend adult literacy classes and that appropriate communication programmes should be designed for all categories of society. Likewise, this research raised a very relevant concern, in the discussion of results, about the cyclone preparedness pamphlets that were distributed in Mozambique in 2007. Even though they were written in the local languages, this information would bypass the illiterate population groups. In countries where the authorities and other non-governmental institutions are presumably aware of the low levels of literacy within a population, they should be far more selective of the communication channels and means that they utilise to broadcast or distribute information. In this way, they would be able to
reach the population at large (and especially those that need it most), rather than just the privileged few.

Also, it should be noted that early warning needs differ from group to group (e.g. farmers require different information to fishermen) (Alam, 2008:4 and Pilon, n.d.:20). Howell (2003:4) found though, that people may ignore early warnings for the reasons provided in figure 44.

Figure 44. Reasons for ignoring early warnings.

<table>
<thead>
<tr>
<th>Economic activity</th>
<th>• People may be engaged in income generating activities such as trading or farming, and do not want to miss an opportunity to earn money.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience of early warnings that are not always accurate</td>
<td>• Sometimes when warnings are given, the weather conditions change, and a storm or cyclone passes without causing damage. People may therefore choose to ignore later warnings.</td>
</tr>
<tr>
<td>Lack of understanding</td>
<td>• People may not understand the information that they receive and therefore not know how to act.</td>
</tr>
<tr>
<td>Fear of robbery or looting</td>
<td>• People who leave their homes or businesses unattended may be robbed or looted. Hence they remain in unsafe areas or conditions, order to protect possessions.</td>
</tr>
</tbody>
</table>


The unpredictability of climate and weather events, as a result of climate change, needs to be taken into consideration though (ActionAid, 2006:3 and Godrej, 2006:23). For example, just as a wildfire can change its course because of changes in the direction of wind, so too can cyclones and hurricanes alter their course of direction unexpectedly, depending on the changes that take place in the earth’s atmosphere. Therefore, it may not always be possible to issue early warning notifications, especially when events take an unforeseen or unexpected turn. Thus, it is imperative that a country and a population employ coping and adaptation strategies. This would help to lessen the effects of extreme weather events. Mozambique implemented such an approach in 2000 already, by resettling affected
households from flood-prone areas to areas that carried less risk for flooding. Such prevention measures are essential in securing the safety and wellbeing of a population and it stresses the important role of government intervention.

c) Evaluation and assessment
In terms of flood disaster relief and recovery operations, Alam (2008:5) importantly noted that the programme phases should be based on actual conditions or events that are happening, and not solely on the designed programmes. For example, during a flood response operation, the occurrence of further flooding might require a revised relief phase. A flood response becomes ideal when it acknowledges changing conditions and when the assessment is a continuous process. Optimal research during flooding generally provides relevant findings and solutions to assist in restructuring the scheduled actions and stages. For example, a nutritional assessment can provide useful information that allows other agencies to organise suitable food packages and identify the intended recipients (DEC, quoted in Alam, 2008:5). Of particular significance, is that the identification of needs and abilities in the assessment stage of the response enhances all the other phases. The causes of vulnerability should be included (e.g. issues relating to gender), so that a comprehensive assessment is produced (Alam, 2008:5 & 6 and Marianti, 2007:10-12).

As identified in the results and the discussion of results chapters, both Mozambique and Zambia conducted continuous evaluations and assessments in the 2007 flooding. This was indeed a very positive action for the reasons mentioned in the above paragraph. However, it is not known how many of the outcomes from these evaluations and assessments were actually endorsed and acted upon. As discussed in the introductory chapter, theory and research (including assessments and evaluations) carry very little weight if it is not translated into actions that are purposeful and significant to the populations requiring assistance (Tickle, 2003). Change can only be brought about by action. Theory alone does not produce the necessary and/or required adjustments that could ultimately, in cases of catastrophic events, determine whether life or death prevails.
It is crucial that the vulnerable populations’ alternatives, concerns and most urgent needs are identified and that it directs an agency’s response strategy. A strategy that can be modified to suit various phases and interventions is the most effective way to reach the most vulnerable people. Such flexibility can be achieved through a monitoring process that utilises, for example, data arranged according to age, gender and vulnerability. This approach is useful for examining the current situation of a population (as well as the corresponding changes needed) and it helps to govern the appearance of new groups of people in need of assistance (Alam, 2008:5-7).

Floods not only affect people and households, but the local economy too. The economy in turn influences how a household recovers and supports its subsistence. Unfortunately, agencies often fail to consider how their flood responses affect the local economy and market. Well planned observation and evaluation would assist in overcoming this pitfall, though (Alam, 2008:9 and Pilon, n.d.:16 & 17). The research discovered that Zambia employed a feasible strategy in 2007, for example. By providing a cash grant that was to be used for resettlement purposes, it allowed the affected population to choose what they needed in order to recover their livelihoods. The grant would also have encouraged spending within the communities, thereby promoting economic growth in other sectors (CAP, 2007:8). In this way, the flow of finances was stimulated.

Apart from evaluating and assessing a situation, it is important to learn from, and apply, lessons learnt from past disasters. This would help to improve prevention and preparedness strategies. A study of the damage, while the evidence of flooding is still apparent, should begin before the cleanup operations. Hazard maps can be documented with information about the range of the flooded area and the level of floods. This exercise would assist in preparing for subsequent flooding, identifying evacuation routes and shelter locations and planning future land utilisation. The documentation and results of lessons learnt can be extremely useful when applied as early as the reconstruction phase (APFM, 2006:26). The preceding chapter governing the discussion of results, disclosed that Mozambique and Zambia appeared to have (in some degree or the other) implemented some lessons learnt from the 2000 flooding event, into the later one. Even though the past lessons may have been carried out on a small-scale, or not particularly consistently, these actions
propose that the countries were in fact attempting to advance in the manner in which they dealt with disasters. Despite their efforts, their general capacity to handle catastrophic events was far from satisfactory.

d) The role of aid agencies during disasters

Various types of aid, during the different phases of a disaster, are absolutely necessary in order to protect and improve the state of a population or area. The DEC, quoted in Alam (2008:12), points out though, that it is not merely sufficient for aid agencies to concentrate on their own projects in instances where the governments of the countries concerned are the leading figures. Instead, aid agencies have a responsibility to partake in extended actions and especially in those that support the local community’s own recovery procedures.

Agencies differ in their level of involvement. Some agencies are engaged in long-term activities, such as providing emergency relief and then remaining active to provide assistance in the development phase, while others take on the role of an external relief provider and only become involved during crisis situations (Byrne & Jones, 2003:56). Essentially it is an agency’s mandate that will determine its level of involvement. Most aid agencies are governed by principles that do not encourage discrimination against religion, race, nationality, class or political affiliation (i.e. agencies are impartial). Furthermore, such organisations are usually autonomous, in that they do not act according to another’s political, or other, agenda (i.e. agencies are independent) (Byrne and Jones, 2003:56 and Kasperon & Kasperon, 2005:23).

The peril exists that an assessment phase will lead to minority or marginalised groups being severed from the intervention. The absence of these groups can result in the loss of information that is influential in the development of a programme, and it can further result in the total exclusion of these groups from the entire programme. It is therefore absolutely necessary that aid agencies pay attention to obtaining data and information from all the existing social groups. An agency’s appointed translator and/or community representative can influence the aforementioned process greatly. In order to overcome this barrier, it is essential that the institution actually extends its contacts farther than the initial channels that were introduced or provided (Byrne & Jones, 2003:95 & 96). In addition, trust plays a crucial part in how well a population
will believe in the information issued and/or the interventions employed by an agency (Kasperson & Kasperson, 2005:23). Through the formation of trusted relationships with the affected populations, an aid agency can also gain admission to crucial security information that can be useful in enhancing the safety and security of the organisation’s workforce (Byrne & Jones, 2003:25).

Although an aid agency provides essential services during times of disaster, the following example draws our attention to its pitfalls. According to Reuters Alertnet (2007), post-disaster Western aid often rebuilds structures like roads and raised railways (that were swept away by floods because they block the flow of water or restrict drainage) in exactly the same way they were before their destruction. This kind of response does not take preventative measures into account, and will only lead to the same sequence of events in future, ultimately hampering progress and development in the end. The given example illustrates the need for aid interventions to consider the preventative and adaptation requirements of a given area.

Agencies’ policies and/or their combined influence may also give rise to certain transformations or processes. For example, the INGC, quoted in Alam (2008:6), found that two months after the start of the Mozambican flood of 2000, the number of people in accommodation centres increased dramatically. This movement occurred because food was only being distributed to people in the centres and not to those in outlying areas. Agencies’ activities can also be affected when another agency presents a new intervention or withdraws an existing one. A more appropriate outcome can be achieved though, if agencies apply improved coordination efforts (Alam, 2008:6). Although food, and other, aid are often the only ways to meet a country or populations’ immediate needs in the light of a catastrophe, it should be carefully monitored in order to avoid dependency. Also, in order to increase a programme’s success in the food security sector (whether food aid, nutritional intervention or agricultural rehabilitation), it is essential that aid agencies understand and recognise indigenous knowledge (Byrne & Jones, 2003:231).

e) The role of local involvement during disasters
In order for the overall responses to function effectively, coordination at regional, national and community levels is mandatory (Pilon, n.d.:18-20). When large numbers
of NGOs, government departments as well as other institutions and agencies are working on the same project (e.g. emergency response to a disaster), then coordination will more than likely become a very big problem. The 2000 flooding in Mozambique had most probably experienced a large amount of initial discord amongst the hundreds of different institutions and agencies working towards providing assistance to the affected population. Each group had its own specific knowledge, skills, strengths and weaknesses. Thus, it was absolutely imperative that there was some amount of coordination (lead by the local government preferably) present for the operations to function effectively. The establishment of the OSOCC office was therefore very necessary for ensuring the smooth and efficient performance of the various aid providers.

Moreover, the affected population should be actively involved in determining their needs and in the development and management of a project (Howell, 2003:9). Although, according to Byrne and Jones (2003:11), “Involving affected populations in operations to ensure their survival is one of the most difficult challenges confronting the humanitarian world”. They maintain that even though local involvement is a firmly established idea in development practice and literature, it has been very difficult to bring into operation in the humanitarian arena. Ideally, the difficulties that are encountered in such circumstances should be managed and overcome, as the affected populations can offer those who are delivering assistance much needed insight and understanding of the local circumstances and requirements (Byrne & Jones, 2003:24 and Howell:2003:8). Accordingly, both those providing aid, and those receiving aid, would benefit.

All too often, project or programme developers will wait until the end of a project or intervention’s development before involving the affected population (Kasperson & Kasperson, 2005:22). On the contrary, the population’s early input can be most beneficial, resulting in interventions that are more appropriate, productive and dynamic. Without the local population’s input, the rewards of emergency and long-term interventions will probably be restricted. Early search and rescue operations, for example, rely heavily on the local community and authorities. Hence, actions that empower their abilities are an effective dimension in the disaster relief process (Alam,
2008:16 and Byrne & Jones, 2003:24). Actions that encourage their empowerment include:

i. risk assessment;
ii. planning;
iii. capacity building;
iv. implementation; and the
v. development of a monitoring system (Pandey & Okazaki n.d.:3).

Usually, it is considered impractical or unnecessary for the local population to participate in emergency relief, such as food aid programmes. However, Byrne and Jones (2003:236) have identified the possible benefits of including the affected population in such processes. These likely benefits include:

i. more appropriate and culturally-suitable food choices (e.g. foodstuffs that take a population’s religion into account, such as halal foodstuffs) and target groups;
ii. improved time and cost efficacy;
iii. effective distributions; and
iv. the formation of a relationship, founded on mutual respect and trust, between aid organisations and the population.

In the case of the 2000 flooding in Zambia, for example, had the authorities consulted with the population that was to be affected by the opening of the Kariba Dam’s gates, then their livelihoods and food security would not have been so heavily affected, and they would have established a good relationship (built on trust and concern) with the authorities. Instead, the Zambian authorities resorted to taking action that had apparently not been addressed on a local, or grassroots, level. Even though this incident did not deal with relief or aid interventions per se, communication with the population would have averted many forthcoming complications. It would have also increased the population’s trust in the authorities, making them far more cooperative or supportive of the government in future (Kasperson & Kaspersen, 2005:23).

A population that has received assistance in the past will participate with aid organisations in a different manner than a population that has never received aid before. Primarily, when a ‘top-down’ (i.e. from the authorities/leaders to the
population) approach to relief interventions have occurred repeatedly, then one might find that a disinterest, lethargy or reliance on aid among the population has developed. However, when local participation has been encouraged, people may feel more obligated and they may depend more on agreements that were made. Hence, as briefly noted in the previous paragraph, when the trust is broken between the locals and an aid agency, through unfulfilled agreements and promises, it can be particularly difficult to reinstate (Byrne & Jones, 2003:54). Ideally then, a community based disaster management approach should include a ‘top-down’ approach in conjunction with a ‘bottom-up’ (i.e. from the population to the authorities/leaders) approach. This will ensure that the general areas of concern are dealt with in a productive manner (Pandey & Okazaki n.d.:3). The involvement of marginalised groups in humanitarian or development activities, such as those identified in the literature review (e.g. women, the elderly, religious and ethnic minorities), increases their safety and encourages the actions outlined in figure 45.

Figure 45. Benefits of including marginalised groups in humanitarian or development projects.

![Benefits of including marginalised groups in a project](image)


When considering sector specific interventions, the following should be noted. For example, a farmers’ participation in agricultural rehabilitation programmes is
especially vital to ensure the success of a programme or project. The reasons for this is because they possess knowledge about their region, the quality of the soil, water availability and cultivation methods. Furthermore, they have experienced and witnessed agricultural programmes that have been successful, and those that have failed (Byrne & Jones, 2003:263). Most importantly though, these programmes form the basis for long-term agricultural recovery, and therefore they should be managed and controlled by the affected population. These same principles can be applied to fishermen. They too, have extensive knowledge of their area and are familiar with the environmental conditions that affect their catches. Hence, their involvement in the planning and management of a programme is essential as well.

Community preparedness for a possible disaster can be achieved and enhanced through the development of an organisation’s potential, the creation of groups that serve a particular function (e.g. life-saving), and by making it possible for them to connect with the national disaster management structures (Alam, 2008:3-12). It therefore becomes quite apparent that local involvement, on whichever level or stage of a disaster, is fundamentally important in ensuring the protection and recovery of the population, as well as the success of an intervention.

Numerous authors have emphasised the advantages of including the population in the planning, development, implementation and management of an intervention or programme (Alam, 2008; Byrne & Jones, 2003; Howell, 2003; Marianti, 2007 and Kasperson & Kasperson, 2005). The affected population’s involvement in the humanitarian or development process carries benefits for them, as well as for the institutions or agencies providing the assistance. Hence, it can be assumed that if Mozambique and Zambia had included their populations in the pre- and post-disaster phases, then the outcomes of the disaster may have been quite different, and perhaps even much more successful.

f) Basic needs requiring attention
It is crucial to pay attention to a population’s challenging susceptibility to floods and to secure that the difference between demand and supply of essential services (i.e. early warning, clean water, adequate sanitation, healthcare and access to food) are fulfilled through maintained preparedness and subsequent emergency arrangements.
In order to protect the quality of the environment and combat the spread of diseases, during and after flooding, it is essential that healthcare providers are properly equipped, water and sanitation conditions are known, disease surveillance is in place and that warnings receive a swift response. The potential for disease is higher in situations giving rise to overcrowding and lowered standards of water and sanitation. The population, authorities and other agencies should therefore develop methodologies and technologies that can support those living in flooded milieus (Alam, 2008:9 & 10). In essence, this forms a large part of the concept of sustainable development that was discussed in the literature review.

Rebuilding permanent housing after a disaster of great magnitude can be a lengthy process. It becomes viable then, to build temporary or transitional shelters with adequate facilities for water, sanitation and cooking. Ideally, procedures for the observation of shelters should be in place too. The prompt provision of such shelters can aid in reducing the outbreak of disease, provide protection from the weather and limit the occupation of public places (e.g. schools) to a brief period of time (Alam, 2008:11). As recognised in the results section, the investigation found that just seven months after the catastrophe, roughly 60% of the houses that were affected by the extreme weather events in Mozambique in 2000 were rebuilt through the assistance of NGOs. This was quite an accomplishment, taking into account the limited resources (i.e. financial, technical, material, and so forth), that was available. Even though temporary shelters are important immediately after a disaster, as noted above in Alam (2008:11), the affected population should be assisted as quickly as possible to return to their homes, so that they can resume their livelihoods as soon as the situation permits.

Peoples’ living conditions do not inevitably improve when flood water levels drop. Frequently, when displaced people return home and aid agencies withdraw assistance, then that is when the actual difficulties set in because floods also destroy assets that provide a means of subsistence and/or a profit. When a population is assisted in protecting their assets, then it helps them to recover rapidly from the disaster and it also lessens eventual vulnerability and poverty (Alam, 2008:8). This view ties in pretty much with the concepts of ‘early warning’ and ‘risk reduction’. Both
of which, can reduce a negative impact on development, through the protection of a population and their assets.

The following are examples of activities that can be undertaken to assist in supporting livelihood recovery, namely:

- repairing roads and infrastructures, providing access to credit and promoting re-skilling, can help to develop marketing prospects or other sources of income that are less predisposed to flooding;
- introducing crop insurance plans;
- drying and preserving seed stocks, hence helping farming to continue;
- promoting flood-resistant crop species and cultivation practices and providing stocks of seeds;
- providing vaccinations, de-worming and fodder, that can contribute to the health and survival of livestock;
- constructing pens and trap ponds that can help to retain fish during floods;
- providing tools, seeds, fertiliser, capital and training that can help people to re-establish their agricultural activities (Alam, 2008:7 & 8 and UNDP, 2000).

\(g\) Coping strategies used by the population

Generally, vulnerable individuals and groups generate their own plan of action and means to assist them in coping with flooding. All these systems do, however, have their own socio-economic and/or timing implications. Flood responses that produce a desired effect, are those that complement a population’s current resources, social assets and manner of managing and coping with flooding. Flood-prone communities usually adapt their living conditions to flooding (Fox, 2004:2), and may have local and traditional organisations in place that are concerned with disaster management. Communities that receive regular flooding are thus probably better prepared to deal with floods, than those that seldom receive flooding (Alam, 2008:3-5).

Whilst receiving aid during a flood disaster, a population can apply a variety of independent coping mechanisms. These include methods that are drawn from indigenous knowledge and skills, as well as from lessons learnt from past experiences. Such responses would lessen a population’s dependency on the
provision of aid, helping them to recover more rapidly. The following strategies, as utilised by the Zambian population during flooding, can assist with coping or prevention methods and thereby reduce reliance on other institutions (Riché, 2007:26). They are namely:

i. placing plastic on top of houses and improving drainage around houses,
ii. living temporarily with neighbours or building make-shift shelters,
iii. gathering and selling wild foodstuffs and trading goods for food,
iv. engaging in activities such as beer and craft making, charcoal burning and selling grass or working as casual labourers, in order to earn money with which to buy food,
v. evacuating areas early as the water levels increase and moving homes, livestock and farming to higher ground,
vi. treating water with chlorine or boiling it to prevent the occurrence of waterborne diseases,
vii. burying ditches to avoid waterborne disease, and treating diseases with medicinal plants.

However, the population found that treating water with chlorine or boiling it to prevent diseases, and treating diseases with medicinal plants, were not very effective.

As revealed in the investigation, the destruction caused by flooding can damage or interrupt electricity services, which can in turn affect a host of other infrastructures and resources. For example, the water supply system in Vilanculos, Mozambique, that was linked to an electrical grid was not operational in 2007 because of flood damages. The systems that were operated by diesel and solar power, on the other hand, were operational (OCHA Report 10, 2007). This particular incident points to the importance of utilising alternative energy sources. Apart from being eco-friendly and thereby reducing the addition of harmful affects to the climate, energy sources that are driven by solar or wind power offer effective substitutes for traditional electricity networks. Moreover, these energy sources can be established in isolated areas, and can be utilised by only one household (or institution) or a whole community. This presents yet another means for a population to cope with, and adapt to, the effects of a changing climate.
h) Coping strategies used in the agricultural sector

The farming practices in many areas would have to change in order to adapt to the changing climate (Fritschel, 2006:9). For example, farmers may have to shift to more drought-resistant crops in regions that experience hotter, drier weather. Cropping patterns would also have to be altered in order to accommodate the changes in climate (Fritschel, 2006:9 & 10). One technique that can help farmers to cope with the unfavourable effects of climate change is to grow trees together with crops (i.e. agroforestry). Once again, the importance of weather forecasts, relevant information, adequate infrastructure, and access to markets and credit, emerged as elements that are necessary for successful adaptation (Fritschel, 2006:11 & 12). However, Darwin (2001) points out that even though farmers may start utilising adaptation strategies, it does not guarantee that they will be able to continue farming in a certain area, or that the income from their activities will not change. Many people face a rather uncertain future when we take Darwin’s opinion into consideration, because in essence he is just supporting what has been noted in the introduction, namely that climate change will hamper agriculture, fishing, as well as access to food (IPCC, quoted in Riché, 2007).

What is done after a harvest, is just as important as producing the crops. If food is protected from spoilage, then the total amount of food available for consumption would increase as well. Thus, activities such as food preservation (in agriculture and animal husbandry) are crucial in diminishing waste and a reduction in food supply. The government and/or other national organisations can also play a more direct role in securing the population’s access to food, by holding reserve stocks of produce that were collected during good seasons, or from regions that yielded a surplus crop, and transferring it to needy areas or populations during difficult times (Hulse, 2007). Zambia’s decision to export maize (a staple food product) in the midst of the 2007 flooding was highly irresponsible. Even though the country may have had a crop surplus at that moment in time, the country’s future food situation was still quite uncertain. They should have rather saved the maize stocks and prepared for a possible food crisis. Similar actions to those carried out by Zambia, during an emergency situation, are not recommended. The implications thereof could be fairly far-reaching, impacting both the food security and the development status of a population.
i) Strategies to protect/promote household food security

A population becomes food and livelihood insecure when frequent floods disrupt the cropping season and damages crops. Flooding of an extended duration can result in the following restrictions, namely:

i. earning an income that can be used to buy food, and
ii. replanting promptly once the floodwaters ebb because either the cropping season had passed or there is no agricultural support (Alam, 2008:8).

The below strategies, can be used to protect or promote a population’s food security.

i. Cash, directly distributed (as either monetary aid or a part of a recovery package) or as a payment for labour, would increase the beneficiaries capacity to respond to their own needs. It would also prevent households from taking exploitative loans, help them to settle their debts, as well as assist them in purchasing necessary items and investing in small-scale activities that generate an income. This intervention can benefit individual households, local businesses and the community at large.

ii. Credit plans and cash transfers can enhance direct food distribution.

iii. Food aid, distributed at the onset of a disaster and for a period that is long enough to protect the livelihood resources of a population, can save lives and support subsistence.

iv. New technologies can be developed and/or utilised for the production, storage and distribution of foodstuffs.

v. Education about food safety and nutrition will assist in preventing food spoilage or illnesses that arise from food, as well as malnutrition (Alam, 2008:8; Hulse, 2007 and Rychetnik, Webb, Story & Katz, 2003:18-42).

Hence, it becomes evident from the above, that vulnerable people should be provided with a variety of fiscal and tangible choices so that they can decide what is most beneficial for them. Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) and ProVention, cited in Alam (2008:8), are of the opinion that available resources, what the agency can distribute or the donor’s preferences should not steer decisions about whether food, cash, a combination of both, or another solution should be used. Instead, an agency’s
responses should be based on a thorough investigation of the problem and very distinct aims.

7.2. Mozambique and Zambia’s responses to climate change adaptation

The research has uncovered a few examples of the progress that Mozambique and Zambia are making with regards to climate change management and/or adaptation. The following provides an overview of the countries’ achievements with respect to climate change adaptation.

During the 2007 flood disaster, the DMMU played a vital role in managing and coordinating responses and interventions. The Government of the Republic of Zambia (2006:212) acknowledged the importance of the DMMU in protecting the Zambian population, their assets, as well as the environment against disasters. These protection activities are achieved through an anticipatory, multi-sectoral, community based, developmental approach. Here, disaster preparedness is combined with prevention and mitigation strategies and policies, so that disaster management can be merged into national development. In addition, this unit is geared towards providing sound information about hazards, risks, vulnerabilities and available resources (Government of the Republic of Zambia, 2006:214). On the surface, the government appears to be in alignment with the concept of sustainable development. However, as shown in the introduction, it is essentially the ability to put the theory into practice that actually counts the most. Nevertheless, credit has to be given to the authorities for making a conscious effort (even though they may not be meeting all these aims in the field).

A report by Chigwada (2004) concluded that the Zambian government was moving in the right direction with regards to development, because it had activated all parties who hold an interest in the country’s economic development. Zambia took a significant step in this process, with the signing of the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Convention to combat Desertification, the Kyoto Protocol, the Rio Declaration (Agenda 21) and the Southern African Development Community (SADC) Protocol on Shared Waters. This action has assisted the country in devising policies that aim to
protect the country from the devastation of climate change that is caused by high evapotranspiration, increasing temperatures, unpredictable rainfall and excessive run-off (Chigwada, 2004). However, Chigwada (2004) added that Zambia’s Disaster Management Policy was feebly sanctioned. He proposed the following actions to enhance the policy’s efficiency, namely:

- added sector involvement, in disaster risk management, between governmental departments, and the
- integration of disaster risk reduction fundamentals into government affairs.

He further recommended that the Zambian government should recognise which sectors require precedence and which technologies are required to merge adaptation policies into the development policy (Chigwada, 2004).

Since Chigwada’s report in 2004, the Zambian government had introduced a Fifth National Development Plan (FNDP) for the period 2006 to 2010. The aims of this plan were identified as:

i. stimulating wealth creation through sustained economic growth;
ii. reducing poverty through the ‘broad-based growth’ approach;
iii. increasing social protection and reducing additional inequality;
iv. improving transport networks between rural areas and the market, so that rural communities can enhance their earning potential (Government of the Republic of Zambia, 2006:1 & 2).

The government had apparently engaged all the major stakeholders, which included the private sector, cooperating partners and the civil society, when compiling the FNDP. Provincial and district development plans, constituting about 81 plans in total, were not included in the FNDP and were to be published separately (Government of the Republic of Zambia, 2006:2). It should be noted though, that even though the government was considering the rural population favourably, the above idea to improve transport networks between rural areas and the market may remain nothing else but a grand plan. Firstly, it is costly to build such networks and secondly, the amount of people that may finally utilise them, is likely to be marginal.

With specific regard to climate change, it was noted that the government would strive towards adopting international environmental agreements during the FNDP’s term.
Zambia had already subscribed to over 20 such conventions, and was willing to adopt even more (Government of the Republic of Zambia, 2006:99).

The needs of Least Developed Countries (LDCs) that are most vulnerable to the effects of climate change are addressed by the Least Developed Countries Fund (LDCF), which is managed by the Global Environment Facility (GEF). These interventions include the preparation and implementation of National Adaptation Programmes of Action (NAPAs) so that the most paramount and immediate needs pertaining to these countries’ adaptation to climate change is determined (GEF, 2008). On the 24th September, 2007 Zambia’s late president, Mr. Mwanawasa, announced at the UN General Assembly’s High Level Event on Climate Change, that the Zambian authorities had just completed formulating a NAPA. According to Mwanawasa (2007:3), the NAPA had identified the agricultural, health, energy and water sectors as being especially vulnerable to climate change. Drought was recognised as the biggest danger in the agricultural sector.

The management of the 2000 and 2007 flood disasters in Mozambique was lead by the INGC. The INGC managed and coordinated much of the interventions, while working closely with national and international departments and institutions. Even though the INGC’s efforts may have appeared satisfactory in the literature consulted for this research, Martin et al. (2001/2002:29) found that the INGC received much criticism for the lack of management and coordination that they displayed in the 2000 event. Oxfam and the Japan Development Agency were two of the international institutions that were rather disgruntled by the INGC’s capacity.

Mozambique’s commitment to development and the wellbeing of its people is probably best summed up in Murphy’s (2005:6) statement that “Despite civil war and major floods and drought, Mozambique has emerged in the 21st century as a country of progress and possibilities...”. For example, the Adaptive Research Project revealed that the villagers of Nwadjahane (Gaza Province) had developed ingenious and inventive approaches to cope with, and adapt to, the variability of the changing climate. Over the past 20 years, the villagers have switched from making cash purchases, to bartering goods or exchanging services. Increased extreme weather events, and a decline in the local economy, have prompted the population to change
the way that they paid for goods or services. Furthermore, formal and informal organisations, households and even individuals from within this community are searching for solutions that will help them to decrease their vulnerability and increase their livelihood recovery (Murphy, 2005:6 & 7).

National planning is purposely paying attention to these issues, because the Mozambican government has acknowledged the necessity to provide assistance to local efforts to strengthen recovery. Murphy therefore concluded that instead of Mozambique dealing with climate change as a separate issue, it is being attended to within a setting that includes other matters pertaining to development (Murphy, 2005:7).

In a statement delivered by Mozambique’s former president, Mr. Chissano, at the World Summit on Sustainable Development in 2002, it was proclaimed that Mozambique had accepted nearly all the environmental conventions and Millennium Ecosystem Assessments connected to the Rio Declaration. Agenda 21 was also implemented and given a high priority in the country’s development programmes (Chissano, 2002). The Kyoto protocol is another example of an international convention that Mozambique had signed.

Like Zambia, the GEF (2008) has also supported Mozambique’s development of a NAPA. As part of the UN’s support to Mozambique’s attempts at addressing climate change in the weakest areas, and in alignment with the NAPA, a collaborative programme called ‘Environmental Mainstreaming and Adaptation to Climate Change in Mozambique’ was created. Figure 46 depicts the 10 partners working on the programme, which is made up of 2 parts, namely,

i. the mainstreaming of environment and climate change issues, and
ii. climate change adaptation.

The programme’s activities were to be concentrated on communication and information, capacity building/enhancement, and specific/pilot initiatives (Zimmerman, 2008:1).
Figure 46. Participants in the programme ‘Environmental Mainstreaming and Adaptation to Climate Change in Mozambique’.


The previous examples clearly illustrate each country’s commitment to addressing issues of climate change and their willingness to implement adaptation strategies. Although their progress may be limited (when one takes into account the number of topics that need to be addressed and the available resources), they have, nevertheless, set the process in motion.

7.3. Flood disaster and food security management plan

The following flood disaster and food security management plan was formulated from Mozambique and Zambia’s experience of the 2000 and 2007 flooding. Even though it has been inspired by these two East African countries, this management plan can be applied to any country where regular flooding disrupts food security. In so doing, reliance on food aid can be reduced or even prevented. The outline of the management plan in figure 47 is to be used as a guide only. Policy-makers and disaster managers may amend and/or extend it to suit the needs of the countries and populations being addressed. A more detailed written version of this plan follows the schematic representation.
Figure 47. Outline of a flood disaster/food security management plan.

1. PRE-DISASTER PHASE

Evaluate

Educate & Inform
- Provide education and information about flooding & food security through various.

Prepare
- Plan, organise & train people to manage a disaster.
- Flood-proof buildings and infrastructures.

Revise
- Identify & modify plans, policies, programmes, projects & regulations.
- Involve civil society in

2. DISASTER

Evaluate & plan
- Involve all stakeholders & assess situation.
- Determine budget, time & actions required.

Respond
- Ensure that the population's basic needs are met (e.g. food, water, shelter & health care).
- Implement projects & programmes.

3. RECOVERY & REHABILITATION PHASE

Evaluate & Analyse
- Engage all stakeholders.
- Determine needs, costs & time.

Execute
- Repair or rebuild structures & infrastructures.
- Assist population to recover their livelihoods & food security quickly. Provide whatever means necessary to help them in this process.

1. Pre-disaster phase:

- **Educate and inform**
  a. Provide information and education about flood hazards, coping and adaptation strategies, as well as food preservation, storage and safety.
  b. Inform and educate via schools, colleges, churches, clinics, village leaders, traditional healers, radio and television stations and other community organisations.
  c. Distribute pamphlets, brochures or posters in local languages or with illustrations for the illiterate. Video presentations and community theatre groups can also be used to inform the public.

- **Prepare**
  a. Issue easy to understand, timely warnings of impending disasters. Use trusted sources for information dissemination, so that the population will take these warnings seriously.
  b. Determine a budget and timeframe for proposed projects and programmes.
  c. Organise and train community and national disaster management teams.
  d. Flood-proof important structures and infrastructures (e.g. health care facilities, houses, grain silos and other food storage facilities).
  e. Build structures where food can be stored above flood level or store it in safer areas.
  f. Identify and remove built structures that can exacerbate flooding or structures or materials that can increase damage during flooding (e.g. harmful substances that can contaminate water).
  g. Plan evacuation routes and make them known to the public.

- **Revise**
  a. Rework and reconsider food export policies and regulations. This can assist in limiting the amount of food that is exported at any given time, ensuring an available supply during periods of disaster.
  b. Determine, enforce and maintain building, land use and farming regulations. For example, this should outline where building or farming can be carried out, or the type of construction that is allowed.
  c. Examine current disaster management plans, focusing on food security, and update as required.
d. Consolidate national and community disaster strategies and allocate resources to disaster risk reduction.

e. Include and encourage the participation of the civil society, especially women, and the private sector in disaster risk reduction and management.

2. Disaster phase

- **Evaluate and plan**
  a. Engage the national and community disaster management teams, the civil society and the private sector.
  b. Evaluate the situation in order to determine needs, and the most vulnerable population.
  c. Develop a plan of action according to initial assessments.
  d. Develop a budget and timeframe for the required actions.
  e. Re-evaluate conditions and review action plans regularly, so that needs may be updated.
  f. Assess the nutritional status of vulnerable groups (e.g. pregnant women and children) and provide treatment or intervention when necessary.
  g. Identify and address food security issues in outlying areas that may need assistance, so as to avoid an unwanted influx of people to shelters, accommodation centres or other areas where food is being distributed.
  h. Examine and identify crop, livestock and fish health, damage and loss.
  i. Determine implement and tool damage and loss.
  j. Create hazard maps and utilise them to identify flood-prone areas.

- **Respond**
  a. Provide emergency food, shelter, medical and/or other aid.
  b. Provide health, nutrition and adaptation education or awareness programmes to people in shelters, so that they may learn how to promote their health and wellbeing and increase food benefits, safety, availability and access.
  c. Implement food-for-assets, food-for-work or other similar programmes as soon as possible, in order to reduce a population’s dependence on aid and to encourage a swift livelihood recovery.
  d. Treat any crop, livestock or fish diseases that have arisen from the flooding and save whatever is worth salvaging.
3. Recovery and rehabilitation phase

- **Evaluate and analyse**
  a. Assess, evaluate and make recommendations for disaster risk reduction procedures.
  b. Identify structures and/or infrastructures (e.g. markets, food storage facilities and roads) that require repair or reconstruction.
  c. Determine financial costs and time required.
  d. Examine means of livelihood, as well as farming and fishing possibilities.
  e. Refer to hazard maps while planning recovery and rehabilitation activities.

- **Execute**
  a. Repair or rebuild the above-mentioned structures and/or infrastructures so that the population may quickly resume livelihood activities. This should be executed bearing the possible occurrence of future flooding in mind, so as to decrease the likelihood of repeated destruction.
  b. Support all actions that will enable a population to swiftly recover their means of subsistence.
  c. Provide the population with emergency farming kits. These kits could include seed stocks, farming or fishing tools and implements, veterinary medicines, and the like, that will assist them in resuming their food production activities promptly.
  d. Continue to educate the public on topics that will help them to secure food availability and access.
  e. Resettle the displaced population to areas that are not prone to flooding. This approach will serve to reduce hazard risks and protect the future of a population’s livelihoods and assets, as well as the environment (e.g. flood plains).

7.4. **Conclusion to adaptation and recommendations**

Climate change adaptation has surfaced as absolutely necessary for the protection of any country’s citizens and resources. Although there is no certain formula for effective climate change adaptation, it has emerged that development in itself, is the most applicable strategy in securing climate change adaptation. Thus, for those countries that have a very low level of development, such as Mozambique and
Zambia, the process of adapting to the changing climate and its associated extreme weather events becomes cumbersome and complex.

Furthermore, it has been established that flooding, which is greatly influenced by climate change, cannot be entirely avoided. The risk that flooding will occur will always be present. In some ways flooding is a very natural part of certain environmental cycles, offering a number of benefits as well (e.g. depositing fertile silt on the flood plains). Hence, the most effective way of actually living with flooding is to adapt to it and mitigate its' effects in the best way possible. A number of recommendations were therefore investigated to develop an understanding of the areas and elements that would need to be addressed in order for the largely devastating effects of flooding to be averted or mitigated.

Preparedness and/or risk reduction strategies are probably the first steps toward avoiding the dangers of flooding. By using both structural and non-structural means of reducing flood risk, a population can protect its assets and infrastructure. Preparedness strategies can also include the issuance of early warnings, or the dissemination of appropriate and helpful information. Such information can be highly beneficial to a population that finds itself on the brink of a disaster, as it would equip them with the knowledge that would guide them to take the appropriate actions, or make the most correct decisions. Without the knowledge of an approaching catastrophe, or how to deal with it, a population would be faced with an unforeseen and rather unpleasant experience. However, a salient consideration in the delivery of information and early warnings is that without a proper understanding of what they mean, a population would probably reduce the messages to nothing more than prattle. The importance of providing information in a way that is understood and functional, would serve to benefit the population much more than simply providing them with data or instructions that are based on making a favourable impression. The target population also determines the type of information that is required. This basically means that the type of information that is conveyed is regulated by the population group for whom the information is intended. For example, the aviation industry would require very different information than the subsistence farmer on the flood plains.
Both preparedness and risk reduction apply to the stages before disaster strikes. Once an adversity has occurred, then the population would essentially have to cope with the situation. During this phase of a disaster, it becomes critical to regularly assess the situation. Regular evaluations and assessments are fundamental to the suitability and success of assistance programmes in particular. The judgments made during such processes would define the changes that need to be made according to the current conditions, thereby influencing the outcomes of the entire programme. Aid agencies or other institutions offering assistance during a disaster should therefore engage in continuous assessment and evaluation. As important as what these institutions are, the role of aid agencies during crises has materialised as one which can carry a dual reaction. This refers to the idea that their interventions can be advantageous in the short term and disadvantageous in the long term. The immediate advantages are, amongst other things, that their delivery of life-saving food and medicines protect the health and wellbeing of the population. In the long run though, the population could develop a dependency on their assistance. Hence, agencies need to be aware of the needs of the population and engage in a dialogue directly with those who are affected. In this way trusting relationships, that can benefit both the population and the agency, can be fostered.

The affected population’s involvement in decision-making processes, as well as in the development and management of interventions, is both valid and necessary. Their input could offer worthwhile insight into the requirements for a successful programme. For example, a farmer’s knowledge of the geographical area, soil quality and other environmental constraints or benefits, could save a proposed agricultural intervention much time and effort in determining these characteristics. By recognising the value of engaging the local community in programmes and projects, an agency not only reaps the rewards of time- and cost-effectiveness, but also delivers the most constructive assistance to the population. As discussed previously, a population’s needs in times of disaster cover a wide scope. The most pertinent of which include the needs for food, water, shelter and health care. Although it is important to address and satisfy these needs in periods of disaster, it is perhaps even more critical to support the population’s coping strategies. This may help a population to recover quickly from the setbacks encountered, enabling them to resume their usual livelihoods promptly.
Sometimes it is even advisable to utilise alternative methods in order to cope with a given situation (e.g. the use of chlorine to purify water and the use of solar power as an energy source). Similarly, those who are engaged in agricultural production would have to consider somewhat untraditional or uncommon practices in order to ensure that they evolve together with the changing climate. In this instance, farmers may have to consider farming another crop type or they may have to begin novel ways of crop storage. There really is very little choice in the matter. The changing climate and all the risks which it presents, requires that people become creative and experiment with new techniques and methods. In some cases, this may possibly be the only way of ensuring their survival. Vulnerable people require a variety of tangible and intangible means from which to choose. In order to produce the best results, these people should be given the opportunity to decide whether they require, for example, finance, food or seeds with which to resume, enhance or adapt their livelihoods. Numerous options are available, but it rests on those in authority to suggest it to the people.

Using information that arose from the literature review and the research, a flood disaster and food security management plan has been developed. This plan demonstrates the abundant options that are available for protecting a population and their food security during a disaster like flooding. The outline of the plan can be used as a general guideline, and applied to any other disaster type. Moreover, the plan can be applied at a household, community or national level. Essentially, four elements are present in the general structure of the plan, namely:

i. educate,
ii. evaluate,
iii. plan and
iv. take action.

These four basic categories can be repeated and maneuvered to suite the circumstances and the target population. As previously mentioned, there are many available options at a population’s disposal, and through the combined efforts of those in authority and those affected by the disaster, an integrated, practical approach to addressing the harsh effects of flooding, can be developed.
The Zambian and Mozambican authorities have indeed shown a very strong commitment to doing everything in their power to encourage development and adaptation to climate change. Many conventions have been ratified by both governments, and plans and programmes have been drawn up. What has been achieved on paper to date appears very impressive. However, it is still questionable whether these countries have actually managed to implement their envisaged schemes. All too often have governments formulated plans and promises that were merely devised to create an admirable image or to achieve certain political interests. The sincerity of authoritative figures therefore lies in the actualisation of programmes and plans, and the good results that they produce.

Arguably, the most imperative aspect of adaptation and disaster risk reduction is the effect that it would have on development. By mitigating the negative consequences that arise from climate change and flooding, a country and population’s development can be protected. For example, by employing some of the flood-proofing strategies mentioned earlier, built structures may be saved from the devastating flood waters. As a result, it would not be necessary for the authorities, or the population, to spend unnecessary labour and resources on rebuilding these structures. In the same manner, if people are taught how to prepare for the arrival of a potential hazard, then many lives, assets and livelihoods can be protected from harm. Also, by living and working in harmony with the environment and recognising the risks that it presents, a population would be able to sustain their existence. For example, by being aware of, and acknowledging hazardous areas (such as floodplains or the known routes of flood waters), it would be wise then not to utilise this land for construction. In this way, a country can gradually and systematically work towards sustainable development.

As already discussed in the literature review, the provision of relief can also be connected to development. The role of aid agencies, as discussed earlier, can be extended to the development arena if they manage and coordinate their interventions in such a manner that it satisfies long-term goals. This could be achieved through education on disaster preparedness or health promotion, or through the establishment of programmes or projects that can be run indefinitely or over a long period of time. In this way, the population would have their immediate needs met, but
they would also be better empowered to continue working towards a more secure and sustained future.

The examination of the concept of adaptation and the corresponding recommendations has been the final subject area in the investigation before the concluding chapter. It has accentuated several difficulties and solutions for a topic that is nearly all too intricate, and at times, even overwhelming. Generally though, it provides a view that is filled with possibilities for the future. Undoubtedly, with proper deliberation, coordination and action, Africa and her people have a chance to overcome the many challenges that the continent faces.
CHAPTER 8: CONCLUSION

The “... climate issue is, in its essence, a development issue” (Banuri & Opschoor, 2007:7). Like others, these authors believe that even if a small portion of the climate predictions come to pass, then the process of development will be reversed and the social, political and economic spheres will be thrown into turmoil. The repercussions that such an occurrence would have on the African continent, which is already consumed by, amongst other things, poverty, HIV/AIDS, civil strife, drought and hunger, are serious. With the additional burden of climate change, those in the developing world, who are made even more vulnerable by factors like those mentioned above, would be cast into a never-ending spiral of distress and despair. Acknowledging this belief, the preceding chapters have sought to present a fairly detailed examination of the relationship between climate change, flooding, food security and development. Only through addressing these issues as a complete whole, and not as separate issues, would some advancement be made.

The topics under investigation required an in-depth understanding that could not be accomplished on a superficial level. Due to the scope of the research, and the time period under investigation, a comparative case study approach was employed, utilising existing statistics. Well over one hundred written documents were consulted, ranging from brief reports and articles to full literary works. Inspired by humanistic, developmental and critical social research principles, this investigation sought to examine the effects of flooding on food security in Mozambique and Zambia, as well as the means to protect food access and availability.

8.1. Overview of consulted literature

A common thread in the theoretical framework was the person-centered or humanistic approach proposed by scholars (e.g. as outlined in Maslow’s hierarchy of needs). Here, an individual is regarded as having basic human needs (e.g. food, water, shelter, physical safety and education, to name a few). If these needs are not met, an individual (and also the leading figure in the process of attaining growth and development) would not be able to function effectively, or even be concerned about any other form of progress. In other words, much of a society’s functioning depends
on the wellbeing of its constituent parts, namely its people. As a result, organisations like the UN are attempting, with the use of policies and strategies (e.g. Millennium Development Goals), to assist countries and people in the fight against poverty, insecurity and underdevelopment.

Without the security and autonomy that fulfillment of the basic needs presents, people are unable to protect themselves from the hazards and risks that they may encounter in their daily lives. According to Beck (2006:4), hazards and risks can be predicted with a great deal more accuracy in today’s world, than what they could have been in the past. Modernity therefore appears to offer society more protection than what was ever experienced before, but yet, millions of people continue to suffer at the hand of tsunamis, earthquakes, drought and floods, to name a few.

However, meeting these basic life-giving requirements, or basic needs, solely at one point in time is not considered to be enough. Instead, the individual, community or population at large, needs to be able to incorporate any advancement into a more long-term scenario. This is where the idea of sustainable development gains prominence. Rather than merely satisfying immediate needs, sustainable development seeks to find solutions to meet the demands of development in the present, in a manner that can be carried forward and utilised in subsequent years. Perhaps for some, the concept of sustainable development may come across as an awe-inspiring idea, or one that cannot be easily achieved in practice. Yet, what is all too easily forgotten is that in essence, sustainable development has been practiced many centuries before the fields of academia and sciences gained prestige (Estes, 1993:4). In those very early years, long before modernity and industrialisation, the native peoples all across the earth, were engaging in practices and employing principles that encouraged the harmonious balance between man and the environment. Hence, the idea of sustainable development is not completely new. Instead, the primary concerns of the 21st century is really about reclaiming that memory, and promoting harmony amongst all of the earth’s systems.

With regard to the natural environment, Africa especially, has been identified as a region that will suffer tremendously from the increase in frequency and intensity of natural disasters that are brought about by climate change. For example, ActionAid
(2006:2-7) regards flooding as one of the main causes that is hindering the urban population of Africa from side-stepping poverty. With the lack of technological resources and good quality data for climate modeling in Africa, it becomes rather difficult to make the necessary predictions about climate change on the continent. Nevertheless, it has been clearly established that the El Niño and La Niña weather phenomena exert a very strong influence on flooding in some African countries. The map of Africa on page 27, undoubtedly presents eastern Africa as the area most susceptible to flooding. This can be attributed to the fact that the sea surface temperatures (SSTs) in the Indian Ocean influence the amount of rainfall in the eastern region (Shongwe, et al. 2008:16). Even though climate change as a natural phenomenon is largely responsible for extreme weather events like flooding, it was found that man’s interference or involvement in the natural environment exerts an almost equally important influence. Human activities like deforestation and urbanisation have all arisen as actions that increase the likelihood of flooding. Moreover, the ability of developing countries to adapt to the changing climate is crippled by a lack of various resources, such as financial and technological investments.

These shortfalls in a country’s ability to protect their population from the devastation of extreme weather events, carries many implications in the area of human security. Human security, which is essentially linked to the basic human needs (e.g. physical safety, food, water, good health, and so forth), is also closely linked to elements of development. All three subject areas are somewhat interwoven and should not be viewed in isolation from each other. The views pertaining to human security and development developed at about the same time as the ideas about environmental security and sustainable development (Khagram, et al. 2003:292). These ideas are therefore closely connected, with sustainable development emerging as a possible solution to the dilemma of insecurity.

WEDO (2008:5) is an example of an organisation that has recognised that human development and the preservation of the environment are not the only fields that suffer from a delayed progress because of climate change. Rather, human security, on a household and national level, is impacted as well. Without proper support, protection, or assistance, a population is quickly faced with the different types of
insecurities, of which food insecurity is one. Climate change alone is predicted to decrease food production in Africa (consequently impacting millions of lives). However, the combined effect from the environmental (e.g. weather conditions), political (e.g. war and conflict), institutional (e.g. policy decisions of NGOs), social (e.g. culture, age, gender) and economic (e.g. financial crisis) spheres serve to also obstruct food availability and access on all levels of society. Many authors and scholars, for example Young (1997), Brown (2004) and Boko et al. (2007), to name a few, have also identified these non-climatic elements as the foremost causes of food insecurity. The food security and development actions and programmes that have been implemented in Africa have generally focused on the correct fields (e.g. enhancing agriculture and rural incomes and decreasing environmental damage). Unfortunately, they were found to be distinctly concerned with certain problems and areas, instead of approaching these issues in a holistic manner. As a result of this rather narrow modus operandi the intended objectives are often not attained (Economic Commission for Africa, 2000:3).

When viewing human security (and specifically food security) in its various phases in relation to a flood disaster, it becomes apparent that poverty and/or underdevelopment are major barriers to protecting an individual from, or preventing a crisis situation. Without the capacity (e.g. finances, tools and implements), an individual cannot gather and store food, and/or take the necessary precautionary measures (e.g. flood-proofing) that will prevent them from being affected by, or lessen the effects of, a catastrophe. When disaster strikes, the individual is faced with the challenge of surviving and coping with the situation. Obtaining food and securing other primary needs, therefore becomes critical. For those in the developing world, living in poverty and without the means to support themselves, they would not have much (if any) of their own resources on which to rely. Without the assistance of the government and NGOs, these people would perish. Once the crisis passes, and the reconstruction or transition phase begins, people are faced with new challenges. Here, they need to rebuild and recover what they had lost. Homes would have to be rebuilt, land would have to be re-cultivated and their livelihoods would have to be regained. In developing countries like Mozambique and Zambia, with a low HDI, such situations will result in a delay in development. Contrary to expanding and advancing on what they already had, those affected by a disaster would have to concentrate
their efforts and savings on restoring their existence to its former state. Without the necessary support and assistance, this unsatisfactory cycle of development will simply continue, as the afflicted population would not have had the opportunity to develop enough protective mechanisms that can be applied ahead of future disasters.

Governments, the people’s pillars of strength in times of crisis, have been criticised for greed, corruption and inappropriate policies, amongst other things, that is restricting the African population’s access to their basic, life-giving needs. According to Adjibolosoo (1999:45), the authorities of developing countries have, over very many years, been attempting to implement a variety of development policies, programmes, projects and plans. Their aims have been to achieve complete development and liberation in the cultural, educational, economic, social and political fields. These countries were encouraged to believe that by conforming to the conventional theories of economic progress and development, which have been devised in the more developed West, they would ultimately realise their goals.

In addition to governmental institutions, NGOs and other institutions providing aid and relief become prominent during times of a disaster, like flooding. Buchanan-Smith & Maxwell’s (1994) views on linking relief and development provided fresh insight to an old problem. They chiefly propose that improved development can decrease the necessity for emergency relief, and that improved emergency relief can support development. Later, they argued though that connecting relief and development is not always suitable or cost-effective. In spite of the pitfalls associated with this idea, they do however still encourage that it should be used experimentally, together with appropriate monitoring, so that a deeper understanding of its operation can be achieved (Buchanan-Smith & Maxwell 1994:15).

8.2. Summary of research objectives and results

In order to ensure that the research addressed its aims etc, a set of research questions as well as aims and objectives were followed. This study therefore achieved its initial goals by addressing the research questions that required attention.
A substantive overview of the relationship between flooding and food security was established through the investigation of:

i. the causes and consequences of the 2000 and 2007 flooding in Mozambique and Zambia;
ii. the effect it had on the population, as well as food availability and access;
iii. the events that occurred prior and subsequent to the flooding;
iv. the strategies and interventions that can be applied in future to strengthen food security.

Firstly, it was necessary to establish the causes of the 2000 and 2007 flooding in Mozambique and Zambia. Was it purely environmental, or did man have a part to play in its occurrence? The results showed that both Mozambique and Zambia were struck by repeated flooding, often within the same year, which resulted in devastating consequences. As previously emphasised, recurrent disasters hamper a country’s development and cast the population into a downward spiral of poverty and suffering. The flooding that occurred in Mozambique and Zambia in 2000 and 2007 was primarily caused by unpredictable, intense and/or frequent weather events (e.g. heavy torrential rains, storms and cyclones). These events were most likely the result of the ENSO phenomenon (Nicholls, 1997). The heavy rains in Zambia, in 2000, were responsible for raising the water levels of the Kariba Dam to its maximum. However, even though the environment provoked the increase in the water levels, it was ultimately the interference of man that brought about the flooding. Likewise, human activities, such as the change of ground cover, deforestation and urbanisation, also often proceed to intensify flooding events (ActionAid, 2006:2-7 and Theron, 2007).

The second, but main objective of this research was to investigate how the flooding impacted the population and their food security. Food security is automatically affected as a population loses its resources and abilities to produce or purchase food. These countries’ low human development index (UNDP, 2008) increases their risk of being severely affected by episodes of repeated extreme weather. The research also shows that a population’s food insecurity and vulnerability is further complicated by a variety of factors such as HIV/AIDS, political instability and conflict, an individual’s social or economic status, the government’s role in pre- and post-
disaster management, as well as the frequency of flooding and/or other weather events. As a result, flooding and its’ impact on food security cannot be studied in isolation. This study achieved this holistic approach, as elements relating to the aforementioned factors were briefly included in the investigation.

Apart from the mass destruction of built structures (e.g. houses and schools) and infrastructure (e.g. electricity networks, water supplies and transport and communication channels), the 2000 and 2007 flooding in Mozambique and Zambia also destroyed crops and livestock (BBC, 2000; Mpofu, 2000:7 & 30; OCHA Reports, 5 & 6, 2000 and OCHA Report 11, 2007). Despite no reports about the destruction of built and other infrastructures in Zambia in 2000, tens of thousands of people were estimated to have been without food as a result of the destruction of their crops. Hundreds of thousands of hectares of cultivated land were cumulatively destroyed in Mozambique and Zambia in 2007, leaving extremely large numbers of people without a potential crop to harvest. The consulted reports did not have much available information about the effects of flooding on fishing, indicating a possible lack of attention to this field.

The loss of crops and livestock were not the only determinants to influence the population’s food security. The destruction of implements that were used in agriculture, fishing and/or to make food, was also experienced. Without these basic, but yet very essential tools, the population could not source or produce food. Also, as a result of the unhealthy conditions brought about by the flooding, thousands of people became ill from diseases like malaria, cholera, diarrhoea and respiratory tract infections (CAP, 2007:6 and OCHA Reports 15 & 25, 2000). With a decreased physical ability, they were not able to engage in activities like farming (to produce food) or working (to earn money with which to buy food). The overcrowded, unhygienic conditions in the shelters and accommodation centres were not helpful either to prevent the spread of disease. Even if people were healthy enough to take up employment or independently trade and/or sell goods, the disrupted transport routes and marketplaces or worksites, hampered these economic activities. Without the financial resources, they could not purchase food either.
Instead, millions of people were forced to rely on the state or other national and international institutions for assistance with their basic needs of food, water, shelter and health care. This leads to the next point of discussion, which includes a summary of these institutions’ involvement in the flooding events. The third goal of this research, was to gain an understanding of the events and actions that occurred prior to, and after the disaster struck. This was mainly fuelled by the need to determine whether or not sufficient actions were taken to protect or improve the population’s food security. Also, it was important to determine whether these countries utilised strategies and policies in the later flooding event, based on their experience of the first.

The Zambian flooding of 2000 provides a very good example of actions taken by authorities without consideration for, or consulting with the population. The BBC (2000) reported that the population received very little, or no warnings before the Kariba Dam’s floodgates were opened. Without forewarning, the population could not harvest the crops that they had planted and neither could they make any preparations to protect themselves or their livelihoods. The Zambian authorities’ actions in this instance were extremely irresponsible. Once the flooding had occurred, and thousands were left without food, no reports could be found about how the authorities assisted the population. Possibly, there may have been some food aid assistance offered by the government or other NGOs that were not reported. However, the only mention of assistance found by this investigation was that seeds would be distributed to the affected population (Mpofu, 2000:30-34). Unfortunately, seeds would not help a population that requires food immediately, seeing as it would take many months before the seeds actually produce the crops for consumption. The flood event in Zambia, in 2000, appears to have been either largely under-reported or simply ignored. It is very likely that much more damage and destruction had occurred from this flooding, but yet more in-depth reports could not be found.

Although it is not clear as to what exactly happened with the authorities’ planning and intervention strategies during the Zambian flooding of 2000, the country nevertheless appeared to have retrieved control over the 2007 situation. In 2007, the DMMU was very active in providing post-disaster aid, and had requested assistance from the international community as well (CAP, 2007:1-8). However, there did not appear to
have been any attention given to early warnings or other information that could have alerted the population of a potential disaster. This would have played a vital part in reducing the population’s vulnerability to the disaster. The authorities, together with various international institutions, addressed the population’s basic needs of food, water, shelter and health care. In spite of the help which they offered to the population, there were many areas pertaining to development (e.g. HIV/AIDS, gender and protection issues) that they seemed to have paid very little attention to.

The Mozambican flooding of 2000, in comparison to Zambia’s event, occurred on a very large scale and resulted in widespread destruction. The government and the international community came to the population’s aid and provided assistance in numerous ways. However, some critics were of the opinion that the international community were too slow with their response (Thompson, et al. 2000 and OCHA & IRIN, 2000). Like in Zambia, in 2000, there appeared to have been very little attention paid to early warning or risk reduction interventions before the 2000 flooding in Mozambique. Much attention was paid to post-disaster activities, in order to assist the population with their health care needs, as well as the provision of food, water and shelter. Besides attending to the population’s circumstances at that particular time, the authorities also began implementing a resettlement programme. Resettlement is an important action for reducing future vulnerability to flood hazards. The Mozambican authorities therefore exhibited an awareness of the importance of protection measures for reducing risk. Generally, Mozambique appeared to have handled the 2000 flooding in an appropriate manner even though there was much more opportunity for improvement. The 2007 flooding in Mozambique exhibited an improvement in the manner in which the Mozambican authorities and other institutions responded to this event. Like during the 2000 event, attention was paid to the population’s basic needs, but some other areas were additionally included in 2007 (e.g. the protection of vulnerable groups) (OCHA Reports, 11-13, 2007).

Despite Mozambique and Zambia’s efforts in the flood response, there is still much more opportunity for improvement in the manner in which these countries manage pre-, as well as, post-disaster activities, though. This brings us to the fourth and final dimension of the research, which had to be examined. Over and above the causes and consequences of flooding, it is most pertinent to pay attention to strategies and
actions that can actually reduce a population’s risk of, and vulnerability to, flooding and food insecurity. Here, the lessons learnt from previous disasters become particularly useful.

The research found that both Zambia and Mozambique had improved in the manner in which they managed the 2007 flooding, when compared to their activities in the 2000 event. This showed that they paid attention to learning from past experiences. In Mozambique, actions that were not utilised in 2000 were applied in 2007. This included forcible evacuations, early warning information, radio broadcasts with cholera prevention messages and the deployment of police officers to accommodation centres (OCHA Reports 1, 2, 12 & 13, 2007). Similarly to 2000, the Mozambican authorities also worked towards resettling people to safer areas. In comparison to Zambia, Mozambique paid much more attention to educational activities, such as HIV/AIDS education and cyclone preparedness (OCHA Reports 10-12, 2007). Education plays an important role in development, as it equips people with the knowledge to make more informed decisions about their lives, and in so doing, they would be better able to protect themselves from the risks that can be found in a society. Although Zambia had probably learnt from the earlier event, the 2007 flooding still showed evidence of a lack of attention to important actions and strategies.

Furthermore, the development of a disaster management plan and the establishment of recommendations (including coping and adaptation strategies) also arise as important and necessary for the protection of a population. The research revealed that preparedness and risk reduction, information and early warning, as well as evaluation and assessment, are all fundamental when attempting to protect the population from hazards and insecurities. The role of governments, aid agencies (as well as other institutions) and the affected population are essentially what guides and directs the success or failure of projects and programmes that are aimed at protecting or improving the population’s conditions. Ideally, all three sectors should be involved in the management and coordination of such efforts, because each has a very vital function to fulfil. The disaster management plan that was devised can be applied to any country that has to deal with issues of food security in relation to flooding. The three phases outlined in this plan which was adapted from the APFM

i. Pre-disaster phase – evaluate, educate, inform, prepare and revise.

ii. Disaster phase – evaluate, plan and respond.


The subject of adaptation to climate change emerged as a topic which, irrespective of its complexities, has many benefits to offer a population in the long-term. The populations of Mozambique and Zambia (as well as many other populations in the developing world) would most definitely reap the benefits of implementing adaptation strategies.

8.3. Contribution to academic literature

This study has especially contributed to academic literature that examines flooding and food security as a combined issue. As mentioned in the introductory chapter, a literature search specifically on how flooding impacts food security did not emerge as a popular topic. Many articles were found on flooding and food security as separate issues though. In the same manner, much literature exists on the subjects of flooding and health or drought and food security. Flooding and food security though, as a combined topic, and within a developmental context, appeared to be a neglected field.

Additionally, a comparison of the effects of flooding on food security in Mozambique and Zambia presents a topic that would support other comparative studies of these countries, or of the region. Furthermore, the disaster management plan and the concluding recommendations could be useful to various institutions in the process of developing and designing plans, policies, strategies, programmes or projects that are particularly concerned with promoting sustainable development.

8.4. Recommendations for future research

Further research is required in order to gain a comprehensive understanding of the effects of extreme weather events on food security, as well as the ability of the
governments of developing countries to respond to such crises. The subject of flooding and food security has presented numerous aspects that can be explored to a greater extent in future research. The following questions are examples of topics that can be examined in subsequent research, namely:

- How do diseases that were brought about by flooding affect nutritional status and food security?
- How do governments and populations prepare to secure food security from future flooding?
- What effect does disrupted transport networks have on food security during flooding?

It may be most beneficial though, to focus on research that aims to contribute to increased knowledge of adaptation, management or the promotion of food security. Also, flooding’s positive effects constitute another area of investigation that is worthwhile delving into. As the APFM (2006:5) has recognised, flooding produces both positive (e.g. fertilising flood plains) and negative (e.g. mass destruction) effects. Understanding and learning to utilise the positive aspects of flooding could offer a population an opportunity to benefit from what this intrinsically natural process offers. Furthermore, this research found that hardly any attention was paid to the effects of flooding on the fishing industry in Mozambique and Zambia. Fishing provides a valuable food source and a chance to earn an income. Hence, it is especially advantageous to expand upon the information surrounding this issue.

The literature review also found that the process of development may be delayed because of the rapid rate at which climate change is taking place. An interesting subject for future research would therefore be to investigate how different people, or countries, are able to cope with this accelerated change that may possibly hinder development. Additionally, over and above governmental and aid agencies or similar institutions, an investigation into the influence that the church (or religion) has in relief and development (in Africa especially) would be a fascinating topic. Religion plays a major role in shaping people’s beliefs, morals and attitudes, all of which have an effect on human security and development, in some manner or the other. Also, as Adjibolosoo (1999) has pointed out, the traditional development plans, projects, programmes and policies that were established in the developed West have not been
particularly successful in developing countries. Research into alternative approaches which are more in line with specific regions (e.g. Africa or Asia) would greatly add to the existing developmental body of knowledge.

The background knowledge derived from such research forms the basis upon which governments and institutions can build sound strategies and policies relating to food security. In turn, this would shield a population from the grip of hunger and ultimately improve and protect human development, thereby creating a more favourable society for all.

8.5. Concluding comments

It may not be possible for man to prevent extreme weather events, nor is it possible, as Alexander (2001) states, for governments to “...accept responsibility for every disaster that may befall its individual citizens”. However, from the investigation of coping and adaptation techniques, it becomes very clear that with the correct coping, intervention, management and/or adaptation strategies, much of the detrimental effects (especially those which affect food security) of flooding can be avoided. The discussion of recommendations and adaptation has shown that there is a wide variety of methods and approaches that can be utilised, on both a national and individual level, to avoid or overcome the destructive consequences of flooding. It has also been recognised more recently, that both the positive and negative features of floods should receive attention (APFM, 2006:1). The positive outcomes (which may otherwise not have been addressed) that arose amidst the trail of destruction in the 2007 flooding included:

- Unschooled children in Mozambique were encouraged to attend classes.
- HIV/AIDS and gender-based violence education was provided in Mozambican accommodation centres.
- Germplasms and traditional varieties of crops received recognition and protection in Zambia.
- Nutritional assessments, malnutrition treatment, de-worming and vitamin A supplements were given to children, and pregnant and lactating women also received nutritional care.
The results indicate quite clearly that even though flooding produces widespread destruction it can be avoided or minimised substantially with proper planning and management, thereby protecting and/or enhancing development. On the whole, both Mozambique and Zambia appear to be geared towards the proper management of the changing weather and the extreme weather events it produces. The countries, and their populations, have shown a commitment to projects and strategies that encourage improved development and the promotion of general safety and wellbeing and food security. If Mozambique and Zambia continue to improve upon these strategies (together with the support from the international community) then the effects of future disasters will have an even lesser impact on the population. However, according to Adjibolosoo (1999:58), the effects of the social, economic, political and educational policies and programmes have resulted in uneasiness about whether developing countries do in fact have any meaningful future ahead of them. He further argues that the constant problems have reached dimensions that cannot be addressed effectively with conventional development views, theories and policy. The time may therefore have arrived for a very drastic change in the way that development issues are tackled.

The most valuable discovery emerging from this research, though, is that food security can be promoted or maintained with careful arrangements and preparation before, during and after a disaster. An awareness of the possibility to protect food security can inspire governments, communities and individuals to work towards eradicating hunger and, in doing so, limit the associated health, societal and developmental problems. Especially crucial to the problem of food security, is the Economic Commission for Africa’s (2000:3) statement that there is a growing agreement that past policies would need to be reviewed in order to properly address this issue. As mentioned earlier, it is becoming more apparent that it is no longer effective to merely utilise the same strategies that have been used in the past. New ideas and approaches are required, if any advancement is to be made in the field of development. Finally, in conclusion to the executed research, the problem statement that ‘Food security in Africa is being affected due to direct and indirect threats associated with recurring flooding events’, can be acknowledged and accepted as being true.
BIBLIOGRAPHY


APPENDIX

Appendix 1

Number of people affected and killed by the 2000 and 2007 flooding in Africa, according to region and country (taken from EM-DAT, 2008).

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**DEFINITION OF CONCEPTS**

i. *Adaptation*
   This process occurs when human or natural systems are modified to reduce the severity of damage, or to utilise advantageous circumstances, in reply to climate change and its associated consequences (UNFCCC, 2008)

ii. *Agroforestry*
   In short agroforestry refers to the “cultivation of trees together with crops”. This practice can assist in improving soil quality, prevent soil erosion, provide shade for crops and it will ultimately help to counter CO$_2$ emissions (Fritschel, 2006:11).

iii. *Chaff*
   The parts of grains and grasses that are separated and discarded after threshing are known as chaff.

iv. *Dambos*
   The FAO (1998) defines dambos as “… seasonally waterlogged, predominantly grass-covered, shallow depressions in the headwater zone of rivers”.

v. *Drought*
   It is a long, dry period (i.e. with no or very little rainfall) that results in crop damage.

vi. *Early warning*
   It is the act of providing adequate information at the right time, so that individuals who are subject to danger may take the necessary actions to avoid or minimise their risk and prepare for an appropriate response (ISDR cited in APFM, 2006:78).
vii. **ENSO**
Changes in the Pacific Ocean are known as “El Niño/La Niña”, while changes in the atmosphere are referred to as the “Southern Oscillation”. These weather events cannot be separated and therefore the term ENSO is generally used. ENSO refers to both the El Niño and La Niña phenomena (South African Weather Service, 2004).

viii. **El Niño**
El Niño events occur when the warming of sea-surface temperatures in the equatorial Pacific Ocean affects atmospheric circulation. This in turn influences rainfall and temperature in particular geographical areas (South African Weather Service, 2004).

ix. **Flood hazard map**
It is a map, generated in agreement with scientific standards, that displays hazards together with information on the magnitude and range of the flooding (Loat/Meier cited in APFM, 2006:77).

x. **Flood plain**
The flat land bordering a river or stream that is subject to flooding is known as a flood plain.

xi. **Flood-proofing**
It is the provision of semi-structural procedures and/or means that are aimed at lessening the destructive force of flooding by avoiding the perilous nature of floodwaters (APFM, 2006:15).

xii. **Flooding**
Geoscience Australia (2008) defines flooding as
“A general and temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters from the unusual and rapid accumulation or runoff of surface waters from any source”.

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xiii. **Food safety**
This refers to the process of handling, preparing and storing food so that the spread of food-borne diseases are prevented.

xiv. **Food security**
The FAO/WHO, quoted in Hulse (2007), describes food security as the state when every person has, at all times, access to enough food that is of a good nutritional quality, that satisfies their health and nutrition needs.

xv. **Germplasm**
Seed or other plant matter used to reproduce plants (Integrated Pest Management Resource Centre, n.d.).

xvi. **Integrated flood management (IFM)**
It is a process that promotes a complete, instead of a partial, approach to the management of floods. Its objective is to enhance the benefits of the flood plains, in conjunction with reducing the loss of life caused by flooding (APFM, 2006:78).

xvii. **Inter-tropical Convergence Zone (ITCZ)**
It is a region near to the equator, where the trade winds of the northern and southern hemispheres meet (Earth Observatory, 2000).

xviii. **La Niña**
La Niña events occur when the cooling of sea-surface temperatures in the equatorial Pacific Ocean affects atmospheric circulation. As a result, rainfall and temperature are influenced in specific geographical areas (South African Weather Service, 2004).

xix. **Livelihoods**
The UNDP, cited in APFM (2006:78), describes livelihoods as the methods used by an individual or household to acquire assets (i.e. the knowledge, objects, skills, socio-economic capital and rights, that can be used as instruments) for survival and personal development.
xx. *Malnourished*

The physical condition or health of an individual can be described as being malnourished when they have not received sufficient nutrients, because of a lack of food or the lack of good quality food, over an extended period of time.

xxi. *Mitigation*

This process is defined as the structural and non-structural procedures employed to reduce the unfavourable consequences of natural and technological hazards, as well as environmental degradation (ISDR cited in APFM, 2006:78).

xxii. *Preparedness*

Flood emergency preparedness was described by the Inter-agency Secretariat of the International Strategy for Disaster Reduction (quoted in APFM, 2006:21), as “activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations”.

xxiii. *Tropical cyclone*

Also known as a cyclone, hurricane and typhoon, a tropical cyclone affects most countries in subtropical and tropical areas. Violent winds, high seas, torrential rainfall, tornadoes and storm surges are some of its characteristic features. Tropical cyclones are classified amongst the most destructive natural hazards because of the devastation it incurs (World Meteorological Organisation (WMO), 2001:6, 7).

xxiv. *Variability*

Variability, with regards to climate, refers to the “… seasonal and annual variations in temperature and rainfall patterns within and between regions or countries” (AMCEN/UNEP, 2003).
xxv. **Vulnerability**  
It is the increased likelihood of a population or individual to be affected by hazards, as a result of circumstances relating to the social, economic, physical and/or environmental factors or systems (ISDR, cited in APFM, 2006:79).

xxvi. **Wetlands**  
It is defined by the U.S. Environmental Protection Agency (2006) as areas where the soil is concealed by water. This water is either on, or in close proximity to, the surface of the soil throughout the year or at different times during the year.