

Sustainable Wildlife Tourism in the Context of Climate Change: The Case Study of Ngorongoro Conservation Area, Tanzania

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ABSTRACT

Attaining sustainability of wildlife tourism has been a challenge in a world of uncertainty. This is even more so when the world's climate is rapidly changing. Scientific evidence suggests that climate change will continue and escalate into the future. All sectors of the economy, including tourism, will be impacted by climate change. Both the human and environmental systems of tourism will suffer the consequences of climate change. Wildlife tourism is one of the tourism subsectors, representing a strong interconnectedness between human and environmental systems, recognised as being vulnerable to climate change. Thus, reducing vulnerability is inevitable if wildlife tourism is to grow sustainably.

Adaptation is one of the two mechanisms for dealing with the consequences of climate change. Wildlife tourism needs to adapt to climate change for it to grow sustainably. Despite this recognition, very little research has been undertaken on how wildlife tourism worldwide can adapt to climate change. As a result, the contribution of research on how wildlife tourism can be sustained has remained elusive. A common feature is the lack of an effective framework for addressing climate change adaptation in wildlife tourism. A review of existing climate change adaptation frameworks found that none of them focused on wildlife tourism destinations. This thesis proposes a conceptual Wildlife Tourism Climate Change Adaptation Framework (WTCCAF) to assist wildlife tourism to adapt to climate change.

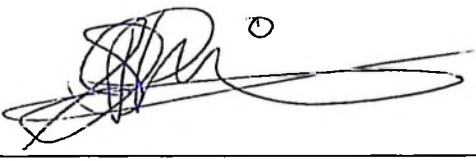
Three steps were adopted to develop such a framework. The first step involved reviewing existing climate change adaptation frameworks for tourism more generally. This review was done in order to understand the context and scope from which these frameworks can be undertaken. Because attaining sustainable wildlife tourism has been a major and urgent issue for wildlife tourism practitioners; the review of literature on climate change adaptation was preceded by the review of sustainable wildlife tourism development frameworks. This was deemed important to develop a theoretical sustainability base against which the review of climate change adaptation frameworks could be evaluated. The outcome of this review was the development of a theoretical climate change adaptation framework grounded in sustainable wildlife tourism development theories.

The second step involved testing the newly developed framework in the field. The formulated framework adopted the following terminologies: shocks and stressors and exposure, sensitivity and adaptive capacity frequently used in climate change studies. In this thesis these terminologies are used as key themes for assessing the vulnerability of wildlife tourism. Ngorongoro Conservation Area (NCA) was selected as a case study for testing the developed framework. The purpose of this test was to understand the factors that heighten the vulnerability of NCA to climate change. This in turn helped to adjust the developed theoretical framework to reflect what was happening on the ground in the field. Primary data were collected from key practitioners of NCA wildlife tourism system including conservationists, tourism businesses and local community. The methods of data collection include in-depth interviews and focus group discussions supplemented with informal conversations and observations. Overall, 86 practitioners participated in this research.

The third step involved the development of a conceptual climate change adaptation framework (i.e. WTCCAF) based on key findings of this study. The intention of this framework is to provide wildlife tourism practitioners with a tool to guide them in developing climate change adaption interventions. Thus this framework makes a contribution to the fields of wildlife tourism and conservation, particularly when climate change is acknowledged as a major threat to the sustainability of wildlife tourism. This thesis however recommends that because not every climate related issue was captured in this study, further research is deemed necessary.

DECLARATION

I, Nickson Peter Mkiramweni declare that the PhD thesis entitled '**Sustainable Wildlife Tourism in the context of climate change: The case study of Ngorongoro Conservation Area, Tanzania**' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Signature:  _____

Date: 29th April 2014

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LIST OF ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CABI	Centre for Agriculture and Bioscience International
CBPP	Contagious Bovine Pluero-pnuemonia
CBT	Community Based Tourism
CCPP	Caprine Pluero-pnuemonia
CMS	Convention of Migratory Species
CTSR	Centre for Tourism and Services Research
DFID	Department for International Development
DSF	Destination Sustainability Framework
ECF	East Coast Fever
FGDs	Focus Group Discussions
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GGCA	Gurumeti Game Controlled Area
GHG	Greenhouse Gases
GMP	General Management Plan
HIV	Human Immunodeficiency Virus
IGCA	Ikorongo Game Controlled Area
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LDCs	Least Developed Countries
LGCA	Loliondo Game Controlled Area
LNGCA	Lake Natron Game Controlled Area
MCF	Malignant Catarrhal Fever
MDG	Millennium Development Goals
MGCA	Maswa Game Controlled Area
MMNR	Masai Mara National Reserve
MNRT	Ministry of Natural Resources and Tourism
NAPA	National Adaptation Program for Action
NCA	Ngorongoro Conservation Area
NCAA	Ngorongoro Conservation Area Authority

NGO	Non-Governmental Organisation
NHFR	Northern Highlands Forest Reserve
NTC	Northern Tourist Circuit
PPR	Peste des Pettis Ruminants
RVF	Rift Valley Fever
SF	Swine Flu
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
SNP	Serengeti National Park
TDR	Tourist Destination Region
TDV	Tanzania Development Vision
TGR	Tourist Generating Region
TR	Tourist Transit Region
TSH	Tanzanian Shilling
TTB	Tanzania Tourist Board
TUI	Tourist Union International
UK	United Kingdom
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational Scientific and Cultural Organization
UNWTO	United Nations World Tourism Organization
URT	United Republic of Tanzania
USA	United States of America
USDA	United States Department of Agriculture
VU	Victoria University
WMO	World Meteorological Organization
WTC	World Trade Centre
WTCCAF	Wildlife Tourism Climate Change Adaptation Framework
WTVAF	Wildlife Tourism Vulnerability Assessment Framework

PREFACE

After realising the importance of wildlife tourism in the local economy, the government of Tanzania declared its intention to protect wildlife for the benefit of current and future generations of Tanzanians, Africans and the world in general. Central to this aim, the government recognised the value of education and multinational collaborations in achieving this intention. To emphasise this, in 1961 the first president of Tanzania, Mwalimu Julius Kambarage Nyerere, made the following declaration:

'The survival of our wildlife is a matter of grave concern to all of us in Africa. These wild creatures amid the wild places they inhabit are not only important as a source of wonder and inspiration, but are an integral part of our natural resources and our future livelihood and wellbeing. In accepting the trusteeship of our wildlife we solemnly declare that we will do everything in our power to make sure that our children's grand-children will be able to enjoy this rich and precious inheritance. The conservation of wildlife and wild places calls for specialist knowledge, trained manpower and money, and we look to other nations to co-operate with us in this important task – the success or failure of which not only affects the continent of Africa but the rest of the world as well.'

Doing this PhD research is thus a product of personal career development initiative and an attempt to respond to the government's efforts to ensure that research findings contribute to the enhancement of sustainable wildlife tourism in Tanzania. The journey that led to this research began in early 2010, after the World Bank Science and Technology Higher Education Project (STHEP), through the Sokoine University of Agriculture (SUA), my employer, awarded me a scholarship to undertake my doctorate study at Victoria University, Australia. The STHEP is the project initiated by the government of Tanzania in collaboration with the World Bank, aiming to build the capacity of Tanzanian academic staff, particularly those involved in teaching at government universities. The project's main objective is to help produce more and better qualified graduates and technicians in strategic disciplines of economic relevance to meet national development objectives in Tanzania.

There are various reasons for choosing the topic addressed in this thesis: (1) I had a strong interest in the topic; (2) tourism is a subject that has been introduced recently in

most Tanzania's universities and, as a result, there is (was) a general lack of qualified staff required to teach this subject; (3) climate change is acknowledged by the government of Tanzania as a new challenge for wildlife tourism, but has received little attention, particularly at the local/destination level; and (4) wildlife tourism is a tourism sector that contributes significantly to the economy of Tanzania, and which is highly vulnerable to climate change. Given these reasons, I feel a responsibility to contribute into the knowledge of sustaining wildlife tourism against the effect of climate change.

This thesis therefore makes an invaluable contribution to my personal career development, to the government's efforts in ensuring that wildlife tourism is sustained so it contributes to the wellbeing of current and future generations, and to fill the gap in qualified academic staff in the area of tourism and climate change. The reason I decided to undertake my PhD study in Australia was based on the personal realisation that Australia is far ahead of Tanzania and other African nations in conducting research related to tourism and climate change. I came to this realisation after spending considerable time reading various articles and books about tourism and climate change, most of which were written by Australian researchers and published in Australia. I realised that Victoria University (VU), is one of the highly ranked universities in Australia where I could access the best knowledge needed to share with my community in Tanzania. Indeed, I thank VU for being a source of such invaluable knowledge.

The material presented herein is my own contribution to the body of knowledge. I strongly believe that this work was conducted with the highest degree of standards and ethics compliance.

CHAPTER ONE: INTRODUCTION

1.1 Climate change and sustainable tourism development

There is strong consensus that the world's climate is changing and that this threatens the sustainable development of tourism (Becken & Hay, 2007; IPCC, 2007a; Jopp et al., 2010; Scott, 2011). Tourism is regarded as a sector that is highly vulnerable to climate change because it is highly connected to natural environment (Richardson & Witkowski, 2010). Climate change will impact the resource base (attractions) upon which tourism depends to attract visitors (Richardson & Witkowski, 2010; Scott et al., 2012; Scott, Jones, & Konopek, 2007; Simpson et al., 2008; UNWTO-UNEP-WMO, 2008). The impact of climate on tourism can bring negative and or positive effects to tourism enterprises and communities.

In some destinations, the negative effects of climate change on tourism may be associated with reduced number of visitors (Gössling et al., 2006; Scott et al., 2008). Consequently, the reduced number of visitors may impact negatively tourism profitability and income for communities dependent on tourism as a major source of income (Becken, 2007, 2010). Given this recognition, various researchers have concluded that climate change is to be considered as the greatest challenge to the sustainable development of tourism in the 21st century (Becken, 2007; Calgaro, 2011; Fennell & Ebert, 2004; Hall & Higham, 2005; Scott, 2011; UNWTO-UNEP-WMO, 2008; Scott, 2011; Simpson et al., 2008). For sustainable development of tourism to occur in the era of climate change, various researchers (including Adger et al., 2003; Adger et al., 2005; Becken and Hay, 2007; Stern, 2007) call for tourism stakeholders to immediately develop adaptation actions to reduce vulnerability to climate change and increase resilience of tourism.

1.2 Tourism vulnerability and adaptation to climate change

Adaptation is seen as one of the necessary mechanisms through which tourism stakeholders develop actions to manage risks associated with climate change (IPCC, 2007a). Adaptation involves the adjustment of economic activities, ecological systems - and people's behaviours - to reduce vulnerability and increase resilience to climate change and to take the advantage of opportunities climate change may bring (IPCC, 2007a; Simpson et al., 2008; Tompkins & Adger, 2004). The United Nations World

Tourism Organisation (UNWTO) (2008b) calls for all tourism destinations to adapt, regardless of the nature and magnitudes of climate change impacts. However, for adaptation to be effective in reducing vulnerability, a thorough understanding of vulnerability - including the contextual factors that perpetuate vulnerability of a tourism system - is crucial (Adger, 2006; Adger, Arnell & Tompkins, 2005; Jopp et al., 2010).

Vulnerability is a concept that has been widely used to denote a condition whereby a system or any of its components is susceptible to or unable to cope with adverse effects of climate change (Calgaro, Dominey-Howes, & Lloyd, 2014a; Calgaro, Lloyd, & Dominey-Howes, 2014b; IPCC, 2007). Vulnerability is a function of: exposure (that is, the degree to which a system or any of its component is in contact with shocks or stressors); sensitivity (the degree to which a system is or can be affected by shocks and stressors); and adaptive capacity (the ability of a system to resist climate shocks and stressors) (IPCC, 2007). Vulnerability is a place- and context-specific, dynamic and highly differential phenomenon (Calgaro, 2011). That is, vulnerability vary between individuals, communities, sectors and subsectors, destinations, types of tourist attractions and tourism business (Becken, 2007; IPCC, 2007a; Scott et al., 2012; Simpson et al., 2008; UNWTO, 2008b). Understanding the context within which vulnerability occurs presents an essential aspect of assessing the vulnerability of a given system and developing adaptations for that system (Jopp et al., 2010).

Vulnerability occurs simultaneously with resilience (Cannon, 2008). In fact, any attempt to understanding vulnerability should go simultaneously with understanding resilience of a system (Calgaro et al., 2013a). 'Resilience is defined as the capacity of a system to absorb disturbances and reorganise itself throughout periods of change, while retaining the system's function, structure and identity' (Calgaro et al., 2013a p. 4). The degrees of vulnerability and resilience of a given system depend upon the magnitude and the type of shocks and/or stressors experienced at a given time, the degree of exposure, sensitivity and the capacity of that system to cope with shocks and stressors (Cannon, 2008). Although a tourism system can be vulnerable and less resilient to climate change its vulnerability and resilience can be reduced and increased respectively through appropriate adaptation actions.

Given that vulnerability is a context and place specific, developing appropriate adaptation actions needs to be a place- and context-based inquiry (IPCC, 2007a). The major challenge is to develop adaptation strategies consistent with the context considered. To overcome this challenge, a deeper understanding of vulnerability occurring at a particular context (i.e. a system, community, wildlife or forest) is essential.

1.3 Vulnerability assessment

Vulnerability assessment (VA) is a practical action, in climate change research and policy formulation, intended to provide an understanding of the system's exposure, sensitivity and adaptive capacity. In other words, vulnerability assessment provides an understanding of the degree to which a system is vulnerable or resilient to shocks and stressors and this understanding provides policy makers and tourism practitioners grounds for developing adaptation strategies (Smit & Pilifosova, 2003; Hahn, et al., 2009; Hinkel, 2011). As vulnerability is a place-and context-specific, VA has to be a place-and context-based in order to understand vulnerability and resilience in the context considered in this study (Scott et al., 2012; UNWTO, 2008a). It is from this understanding that the appropriate adaptation strategies can be developed and implemented.

However, developing appropriate adaptation strategies for a particular destination depends on accuracy of methods used to assess vulnerability (Hahn, Riederer, & Foster, 2009; Smit & Pilifosova, 2003; Smit & Wandel, 2006). Some studies that have attempted to assess destination vulnerability in order to develop adaptation actions suggest for the application of conceptual frameworks (Calgaro et al., 2013; Jopp et al., 2010; 2012). A conceptual framework helps to keep VA more focused. A conceptual framework also helps to organise different vulnerability and adaptation issues around themes to ensure that during VA the key factors that perpetuate vulnerability are taken into consideration. Furthermore, in a system consisting of complex interactions of components, a conceptual framework helps to organise complex issues into a single diagram which makes an understanding of vulnerability and adaptation even more easier.

This study is focused on terrestrial African wildlife tourism. Boko (2007) stressed the need to design practical adaptation strategies consistent with the African context. This emphasis is based on the fact that Africa presents a range of complex issues: political, social, cultural, environmental and economic, which together can make adaptation to

climate change in Africa even more complex and difficult. Given that this study is based on a complex African wildlife tourism system, applying a conceptual framework to assess the vulnerability and existing adaptations in such a complex context is very important. This helps to understand the degree of vulnerability, identify factors that perpetuate vulnerability and adaptation gaps and to systematically propose appropriate adaptation strategies for African wildlife tourism.

1.4 Climate change and African wildlife tourism

Wildlife tourism is one of the tourism subsectors considered as highly vulnerable to climate change (IPCC, 2007). In Africa, vulnerability of wildlife tourism can be even more because Africa has low adaptive capacity due to poor economic situation (IPCC, 2007a) and its tourism product relies on natural attractions and ecosystems which are sensitive to climate change (Dudley et al., 2010; Scott et al., 2008). Impacts associated with warmer temperature, increasingly frequent and intense droughts, floods and diseases present a range of negative impacts for African wildlife tourism (IPCC, 2007). These impacts will also pose negative consequences for destinations' amenity value and consequently this may affect visitor numbers (Becken, 2007). Therefore, the possibility that climate change will reduce the sustainability of Africa's wildlife tourism is high, unless effective adaptation strategies to increase the resilience of this sector are planned and implemented (Newsome et al., 2005; Rodger et al., 2011). Consequently, research to assist African wildlife tourism develop adaptation strategies in order to make it more resilient to climate change is critically important.

Tanzania is one of the African countries that have benefitted significantly from wildlife tourism (URT, 2010). However, the government of Tanzania recognises that wildlife tourism will decline because the resources on which it relies are vulnerable to climate change (URT, 2008). Specifically, the government recognises that climate change will fragment wildlife habitat such as forests, woodlands and wetlands, and will consequently expose wildlife to shocks and stressors such as floods and droughts respectively (URT, 2008). Climate change will further affect migration and breeding patterns of Tanzania's wildlife (URT, 2008). Moreover, frequent and severe droughts resulting from climate change will affect water and forage availability for wildlife and livestock, and this will alter the patterns of land use by communities living within or adjacent to wildlife, leading to increased pressure on wildlife resources. These shifts will consequently affect the quality of recreation and leisure in wildlife reserves and in

turn affect tourism (URT, 2008). Climate change is thus an obvious threat to the sustainability of Tanzania's wildlife tourism and, therefore, this subsector needs to adapt.

Although the Tanzania's National Adaptation Program for Action (NAPA) recognises that adaptation can reduce vulnerability to climate change, NAPA does not provide a clear framework for assessing vulnerability, developing and implementing adaptation strategies in wildlife tourism. This omission has led to the lack of climate change adaptation strategies in the general management plans (GMP) of Tanzania's protected areas (PAs) where most of wildlife tourism activities take place. This omission leaves Tanzania's wildlife tourism less prepared and protected from climate change.

Ngorongoro Conservation Area (NCA) is one of the prime wildlife destination and the most visited protected areas in Tanzania, East-and Africa more generally (Galvin et al., 2004; Melita & Mendlinger, 2013). Being a source of leisure, recreation and happiness for both international and domestic visitors, NCA generates millions of dollars, supports hundreds of jobs and, as such, it is an important destination that facilitates business for local and international economies. Covering 8,292 square kilometres (Mendlinger et al., 2011; MNRT & NCAA, 1966), NCA operates under the philosophy of multiple system of land use, in which wildlife, people and livestock co-exist. This is the essence of wildlife tourism product in this area, and it presents a complex and real coupled human-environment system (Dong et al., 2010; Liu et al., 2007; Moore & Rodger, 2010; Vihervaara et al., 2010). According to Smit and Wandel (2006), where there is strong human-environment interactions vulnerability to climate change and other compounding factors may be high. Thus, understanding vulnerability and resilience of such a tourism system warrant researcher's attention.

1.5 Problem statement

The sustainability of wildlife tourism depends on research into potential negative (and positive) impacts (both climatic and non-climatic) on society, community, ecology, ecosystems, and tourist satisfaction (Higginbottom et al., 2003; O'Neill et al., 2004; Rodger et al., 2009, 2011). Unfortunately, for several decades the enhancement of sustainable wildlife tourism has been focusing on addressing non-climatic impacts, particularly those impacts emanating from tourist numbers. Climate change is

recognised as among the greatest challenges for wildlife tourism but that recognition has received little attention in sustainability plans. As a result many researchers and practitioners have focused on managing non-climatic impacts, while leaving wildlife tourism less protected from, or under-prepared for the consequences of climate change. As such the knowledge of sustainable wildlife tourism in the context of climate change has remained elusive.

Specifically, Calgaro et al. (2011) point out that little progress has been made in the last two decades on how to systematically reduce vulnerability - to climate change - in a wider coupled human-environmental system, of which wildlife tourism is a part. In Africa, this is particularly associated with little understanding of wildlife tourism vulnerability in respect of its exposure, sensitivity and adaptive capacity against shocks and stressors. An understanding of these factors is very crucial as it provides directions for assessing vulnerability and resilience of African wildlife tourism. As pointed out in sections 1.3 of this chapter, for a better understanding of these factors, as they occur in a complex wildlife tourism system, the use of a conceptual framework is essential. Although there are various theoretical frameworks developed to assist destinations to adapt to climate change more generally, or for other forms of tourism such as small islands tourism (Becken, 2007; Calgaro, 2011; Jiang et al., 2012; Jopp et al., 2010; Simpson et al., 2008), none of these frameworks have been applied to African wildlife tourism. As a result there is a general lack of a clear framework for addressing climate change in African wildlife tourism. This presents a serious gap in the knowledge required by wildlife tourism stakeholders to address climate change. This underlies the need to develop a conceptual framework that suitably addresses wildlife tourism vulnerability, resilience and adaptation to climate change.

1.6 Aim

To address the above problem, this research aims to review existing frameworks for climate change adaptation and their applicability to wildlife tourism, and if necessary, develop a new theoretical framework to assist wildlife tourism to understand vulnerability and adapt to climate change.

1.7 Research objectives

- i. To review the literature and identify theoretical and practical frameworks that address vulnerability and adaptation to climate change in tourism and, if necessary, use this review to develop a theoretical framework suited for African wildlife tourism;
- ii. To describe the NCA's tourism system and identify the impacts (both shocks and stressors) that trigger the system's vulnerability to climate change;
- iii. To use the framework developed in the first objective to assess vulnerability by examining the factors that determine wildlife tourism exposure, sensitivity and adaptive capacity to the identified shocks and stressors;
- iv. To propose and recommend adaptation strategies appropriate for improving the adaptive capacity of NCA wildlife tourism system;
- v. To propose a new climate change adaptation framework that best captures the contexts of wildlife tourism in NCA, Tanzania and Africa more generally.

1.8 Scope and limitations

This thesis focuses on the development of a conceptual framework for vulnerability assessment and adaptation to climate change in wildlife tourism. The development of this framework contributes to addressing sustainability of wildlife tourism in the context of climate change. The framework integrates knowledge of sustainable wildlife tourism, knowledge of climate change vulnerability and adaptation developed from the literature and field data. Furthermore, the framework is holistic as it covers the key aspects of a coupled human-environmental system (i.e. the human and environmental aspects of wildlife tourism).

The study was conducted in Ngorongoro Conservation Area (NCA). Adopting a holistic approach, the study involved the key actors in the NCA wildlife tourism system including the local community, tour guides, hoteliers/lodgers and conservationists. Local community represents all users who benefit from tourism in the studied destination, but to limit the scope, this study focused mainly on understanding the vulnerability of indigenous/native residents of NCA and tourism businesses operating within NCA. Therefore, in this thesis, local community refers to indigenous (native) community of NCA (that is, the *Maasai*).

1.9 Contribution of the research to knowledge

A lack of conceptual frameworks that suitably addresses climate change in African wildlife tourism not only limits the advancement of research on climate change in the latter, but also denies African wildlife tourism managers and policy makers a practical tool to use in addressing climate change. Thus, this research makes a significant contribution to the fields of wildlife tourism and conservation, particularly where climate change is acknowledged as a major tourism threat. The research provides a conceptual framework for investigating and managing the impacts of climate change in African wildlife tourism. Thus developing this framework makes a significant contribution to the enhancement of Africa's capacity to deal with climate change in wildlife tourism more generally.

1.10 The research framework

Table 1-1 presents a roadmap of this thesis with an overview of how the objectives needed to accomplish research will be achieved. This incorporates the information required and the methods applied to achieve each objective including the rationale for research methods. The table also details the chapter in which the objectives are discussed.

Table 1-1: Research framework

Research objectives	What information is needed?	How information will be gathered?	Why the method is appropriate?	Thesis chapters
(1) To review theoretical frameworks that address vulnerability and adaptation to climate change in tourism, and if need arise, use this review to develop a theoretical framework suited for assessing vulnerability and adaptation to climate change in wildlife tourism.	Theoretical information on: <ul style="list-style-type: none"> • tourism and sustainable wildlife tourism; • climate change and wildlife tourism; • vulnerability assessment and climate change adaptation frameworks in tourism; and • the suitability of existing frameworks in addressing climate change in wildlife tourism. 	Extensive review of both the academic and grey literature.	The method helps to develop an understanding of: theories underlying sustainable wildlife tourism in relation to; climate change in wildlife tourism including the knowledge gaps in the literature about sustainable wildlife tourism in relation to climate change.	2 & 3
(2) To describe the NCA tourism system and identify shocks and stressors that trigger vulnerability of the system.	Analysis of the NCA tourism system and identification and assessment of shocks and stressors (with respect to the key elements of the wildlife tourism system).	Apply methods such as: in-depth interviews; focus group discussions (FGDs); analysis of secondary data; observation and informal conversations.	The method helps to identify and understand the interactions of system components; and identify the risks and opportunities faced by NCA wildlife tourism;	4 & 5
(3) To use the framework developed in the first objective to examine the exposure, sensitivity and adaptive capacity to shocks and stressors.	Analysis of factors that determine the NCA's <i>exposure</i> to shocks and stressors (with respect to the main elements of the system).	Apply methods: in-depth interviews; FGDs; observation and informal conversations; and analysis of secondary data.	Helps to gain an in-depth understanding of factors that affect the system's exposure to shocks and stressors.	6
	Assessment of the <i>sensitivity</i> of the system units (with respect to the main elements of the wildlife tourism system)	Apply methods such as: FGDs; analysis of secondary data; in-depth interviews; observation and informal conversations.	Helps to understand the factors that determine the sensitivity of the system to shocks and stressors.	7
	Assessment of the system's <i>adaptive capacity</i> (with respect to the main	Apply methods such as: in-depth interviews; FGDs; and analysis of	Helps to understand the local knowledge in terms	

	elements of the wildlife tourism system).	secondary data.	of adaptation to climate change.	8
(4) To propose and recommend adaptation strategies appropriate for improving the adaptive capacity of African wildlife tourism.	Proposing new strategies for improving the adaptive capacity of the studied system, and recommendations for further improvement of adaptive capacity.	Reviewing the literature and assessing the existing adaptations to identify gaps (i.e. adaptation gap analysis).	The literature review helped to identify various adaptation options. Gap analysis helped to identify adaptation gaps.	9
(5) To propose a vulnerability assessment and adaptation framework suitable for wildlife tourism in NCA, Tanzania and Africa more generally.	Developing the framework that is consistency with African situations.	Assessment of key information from the empirical data; assessment of key information from the literature and integrate and present an outline of the information from the research findings.	Helps to propose modifications of theoretical models to reflect the actual situations.	10

Source: Adapted from Klint (2013 p. 8-9).

1.11 Thesis organisation

The organisation of this thesis is presented in table 1-2. The table provides a summary of the key issues to be addressed in each chapter.

Table 1-2: Thesis organisation

Thesis structure	Key issues
Chapter one: introduction	This chapter introduces the thesis based on a brief literature review. It highlights the problem statement, aim and objectives of this thesis. Finally, the chapter sets the scope and limitations of the thesis.
Chapter two: literature review	Chapter two provides a review of literature. It positions the thesis on what is already known about wildlife tourism sustainability and climate change. Further, the chapter provides highlights on tourism relation to climate change, including how tourism can be vulnerable to climate change. Importantly, the chapter introduces the terminologies such as shocks and stressors, exposure, sensitivity and adaptive capacity used in climate change studies.
Chapter three: reviewing existing frameworks for assessing vulnerability and adaptation to climate change in tourism	The chapter provides a review of the existing frameworks that have been used to address climate change in tourism more generally. By doing so, <i>the chapter responds to objective one of the thesis</i> . It reviews the frameworks that are broadly developed for tourism. This is so because the literature provides limited information about frameworks that specifically address adaptation to climate change in wildlife tourism. Finally the review of these models provides insights into developing a theoretical model that is suited for assessing vulnerability of wildlife tourism.
Chapter four: methodology	The chapter explains the research methodology. It explains how the theoretical framework developed in chapter two was used to collect field data (i.e. examinations of factors that determine the exposure, sensitivity and adaptive capacity of the NCA wildlife tourism system to shocks & stressors. It also explains how the collected data were analysed.
Chapter five: understand the NCA tourism system and the factors (both shocks and stressors) that trigger vulnerability of the NCA's tourism system to climate change	This chapter begins by describing the NCA's wildlife tourism system. Then, it presents and discusses key shocks and stressors that trigger vulnerability of the NCA to climate change. These include direct and indirect climatic events. The shocks and stressors are discussed with respect to key system components (the local community, wildlife and their habitats, and tourism businesses). <i>The chapter responds to objective two in the thesis</i> .
Chapter six: understand the factors determining the NCA system's exposure to shocks and stressors	This chapter provides an assessment of factors that determine the exposure to shocks and stressors of the NCA's wildlife tourism system. This is done in relation to key system components. <i>This chapter responds partly to objective three</i> .
Chapter seven: sensitivity of NCA to shocks and stressors	This chapter discusses the factors that determine the sensitivity the NCA's tourism system to shocks and stressors. <i>The chapter addresses part ii of objective three</i> .
Chapter eight: adaptive capacity to	This chapter presents the examination of factors that determine the adaptive capacity of the NCA's tourism system. The chapter also

shocks and stressors of the NCA tourism system	discusses the consequence of the tourism system's failure or lack of adaptation. <i>The chapter addresses part iii of objective three.</i>
Chapter nine: Proposing and recommending adaptation strategies	Based on vulnerability findings, this chapter proposes and recommends adaptation strategies appropriate for wildlife tourism. <i>This chapter responds to objective four.</i>
Chapter ten: Proposed model for wildlife tourism system	This chapter presents the developed conceptual model for climate change adaptation in wildlife tourism. It highlights the outlines of how the framework was developed. The chapter presents a broad application of the framework as well as its limitations in vulnerability assessment and adaptations to climate change in wildlife tourism. <i>The chapter responds to objective five.</i>

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature review presented in this chapter begins by establishing a broad understanding of tourism including the identification of key issues in contemporary tourism research. The review then discusses how climate change may impact tourism. The chapter highlights the key features of wildlife tourism and a discussion of how climate change will affect wildlife tourism, the adaptation strategies currently available in wildlife tourism and why it is important to develop new adaptation strategies. In other words, this review helps to identify the knowledge gap in the literature. Finally, as the aim of this thesis is to develop a theoretical and practical framework for assessing vulnerability and adaptation to climate change, the chapter identifies key issues for the development of this framework.

2.2 Tourism

Tourism has been defined as ‘the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to exercise of an activity remunerated from within the place visited’ (Page, 2012b, p. 11). Some authors (Page, 2012b; Weaver, 2006; Weaver & Oppermann, 2000), have associated tourism with three specific components: (1) the movement of people (travelling); (2) a sector of the economy or an industry; and (3) a broad system involving the interactions of subsystems tourists, local communities, natural and built attractions and the people involved in delivering services and/or products to satisfy tourists’ needs. These components suggest that tourism is a complex multidisciplinary topic and therefore tourism research needs to consider knowledge integration.

Tourism, as part of the economic sector, is regarded as one of the most reliable economic activities (Hawkins, 2012; McCosker, 2012; Panitchpakdi, 2012). And thus tourism has been used by various nations –including Tanzania– as a means of achieving sustainable development (Gössling et al., 2009). However, tourism is associated with a number of negative human and environmental impacts including environmental degradation, pollution and climate change (Becken, 2007, 2010; Page, 2012b;

Spenceley, 2008). These impacts may prevent tourism from contributing to sustainable development. For tourism to continue its role of achieving sustainable development, various researchers (Becken & Hay, 2007; 2012; Higginbottom, 2004; Newsome, 2005) are calling for the development of practical actions to prevent tourism from causing or being affected by negative consequences. From a climate change perspective, Stern (2007) stresses the need for early prevention. Otherwise the cost of delaying or not taking action may be higher than the costs of taking action immediately. Stern is actually emphasising the importance of addressing climate change in sustainable tourism development.

The sustainable tourism development concept emerged in the 1970s (Page, 2012a) and it has been an underlying topic in contemporary tourism research. The purpose of sustainable tourism development is to ensure that tourism contributes to the broader goal of sustainable development with minimum impacts across social, economic and environmental domains (Dudley et al., 2010; Page, 2012a; Spenceley, 2008). To meet this end, sustainable tourism requires tourism practitioners, academicians and policy makers to constantly identify the potential and actual negative impacts for tourism and design practical actions to deal with the consequences of those impacts (Page, 2012b; Spenceley, 2008). Climate change has already been identified by various scholars as a real risk to tourism (Adger et al., 2003; Hall, 2012; Houghton et al., 2001; IPCC, 2001, 2007a, 2007b; Simpson et al., 2008; Stern, 2007). It is important to note however that climate change may not necessarily cause negative impacts rather it may present opportunity to some destinations. Therefore, the major role for researchers, tourism practitioners and policy makers should be to design practical adaptation strategies to reduce the effects of climate change on tourism and capitalise on opportunities adaptation may bring. The conceptual framework is deemed important to guide the designing of adaptation strategies (Calgaro, 2010).

2.3 Tourism and climate change

2.3.1 Key terms used in climate change science

The research on wildlife tourism in relation to climate change requires researchers to have prior knowledge of terminologies frequently used in climate change science. This knowledge enables a researcher to be familiar with the concepts underpinning climate

change. There are many terminologies used in climate change science but this study presents seven terminologies that will feature frequently in this thesis. These include: vulnerability, exposure, sensitivity, adaptive capacity, adaptation, shocks or stressors (perturbations) and resilience. These terms are described as follows.

Vulnerability

Vulnerability is a concept that has evolved from disaster management, food security, and climate change science (Calgaro, 2011; Jiang et al., 2012a; Klint, Wong et al., 2012b). As a result the concept is defined differently by different authors, depending on the field of application (Klint et al., 2012a, 2012b). From climate change perspective, vulnerability has been defined as the degree to which a studied unit (or system) is susceptible to, or unable to cope with, adverse effects of climate change including climate variability and extremes (IPCC, 2007a, p.6). Vulnerability can apply to an individual or a group, a community, a sector, a system or a place (Calgaro, 2011; Cutter & Finch, 2008; Klint, 2013). It can also apply to economic, physical, ecological or social conditions (Klint, 2013; Ritchie, 2008). As tourism comprises all of these, an attempt to assess vulnerability of tourism to climate change needs to focus on vulnerability of a specific unit of analysis, but it should also consider the knowledge from other related disciplines (Klint, 2013; Ritchie, 2008). Understanding the extent and patterns of vulnerability of a given system or a system unit is an essential ingredient of developing adaptation strategies (Smit & Pilifosova, 2003; Smit & Wandel, 2006).

Vulnerability is a function of exposure, sensitivity and adaptive capacity, being directly related to exposure and sensitivity and indirectly related to adaptive capacity (IPCC, 2007a). In practical terms, vulnerability can only be assessed after the factors that influence exposure, sensitivity and adaptive capacity of a studied system have also been assessed (Calgaro et al., 2014). In a coupled human-environmental system, like the wildlife tourism system, this assessment enables a researcher to understand differential vulnerability of the system components (such as communities, tourism businesses, visitors, landscapes and ecosystems) in order to identify the most vulnerable component (Calgaro et al., 2014). Thus this knowledge is needed prior to developing adaptation actions (Calgaro et al., 2013b; Jopp et al., 2010). More important is a need to understand both shocks and stressors against which exposure, sensitivity and adaptive capacity can be assessed.

Shocks and stressors

The negative events that occur suddenly and last for a very short period of time (e.g. tsunamis, earthquakes, storms, volcanic eruptions, landslides, avalanches and wildfires) are referred to as shocks (Calgaro et al., 2014). Conversely, those that occur at a slow pace with their impacts being observed for the long term are referred to as stressors (Calgaro, 2011; Calgaro et al., 2014). According to Birkmann (2007) and Calgaro (2011) shocks and stressors can be triggered by both anthropogenic and natural causes. When they occur they present a reminder of a system's strengths and weaknesses in resisting negative events. That is, the degree to which a system is vulnerable or resilient to climate change impacts. According to Calgaro et al. (2013b), the assessment of shocks and stressors needs to be a one step ahead of vulnerability assessment.

Exposure

The IPCC (2007) defined exposure as the magnitude and duration upon which the exposed unit is in contact with shocks and stressors. Other authors (Bhatia et al., 2010; Calgaro et al., 2013a; Clark et al., 2001) define exposure as the degree to which: people, assets, e.t.c., come into contact with perturbation or hazardous events. According to Bhatia et al. (2010), people or assets that come into contact with a hazardous event are referred to as exposure units. Exposure is a contextual phenomenon that is determined greatly by differential system's intrinsic factors (such as biophysical characteristics (Calgaro et al., 2013a, 2013b) and extrinsic factors such as climate change (Williams et al., 2008). Differential biophysical characteristics cause a destination to experience differential exposures and hence differential vulnerability and resilience. This is so because biophysical characteristics may present different ways through which shocks and/or stressors make contact with the exposure unit (Calgaro et al., 2013). Exposure to multiple climatic shocks and stressors is a real concern for developing countries because most of their economic sectors (including wildlife tourism) depend on climate (O'Brien et al., 2004). In a coupled human-environment system (like wildlife tourism), the most significant effects of climate change occur where there are a large number of people (local community and visitors), wildlife and plant species and a variety of habitat that are exposed to climatic shocks and stressors (Becken, 2007, 2010; IPCC, 2001, 2007a; Williams et al., 2008). Thus, it can be argued that any attempt to assess vulnerability of such a system should begin by an assessment of how these components interact to influence the functioning of the system.

Sensitivity

Sensitivity is another concept commonly used in climate change studies. It is the degree to which a system or any other unit of analysis is or will be affected, or the way the system/or unit responds (positively or negatively) to climate stimuli (O'Brien et al., 2004, 2007; Smit & Wandel, 2006). Sensitivity is basically an element of the biophysical effect of climate change on a destination, although it can be altered by socio-economic factors (O'Brien et al., 2004). The implication is that sensitivity is shaped by two main factors: magnitude of climate stimuli and pre-existing social, political, environmental and economic characteristics of an exposure unit (Cannon et al., 2008; Reynolds, 2001; Smit & Wandel, 2006; Williams et al., 2008). These in turn are shaped by existing governmental structures and processes (Calgaro et al., 2013a; Williams et al., 2008). Although sensitivity is an element of negative impacts, it may also incorporate beneficial ones (IPCC, 2007b). In addition, sensitivity can also be shaped by the type of tourism product a destination offers consumers and the mode of production and delivery of that product (Calgaro, 2013).

Given these factors, Calgaro et al. (2013b) proposed the following categories of sensitivities: (1) *tourism-specific* including seasonality, marketing strategies, destination location, positive or negative responses of tourism to shocks and/or stressors; (2) *assets related* including *economic assets*, such as livelihood portfolios, liquid and fixed assets, credit history and insurance, job security and welfare safety nets, and *human and social assets* such as knowledge and skill levels, labour capacity, information on risks and trends and kinship networks and groups; and *physical and environmental assets* including access to natural resources, infrastructure and transport options, and biophysical alterations; and (3) *governance processes*, as they play a major role in influencing access to and distribution of resources necessary for coping or adapting to shocks and stressors. All these categories of vulnerability are relevant for this study and I adopt them as subthemes for assessing vulnerability in NCA. However Calgaro's (2013a) classification of sensitivities is exclusively based on the human component of a tourism system. In essence, Calgaro's (2013a) second category of sensitivity mainly focuses on how humans can be vulnerable or resilient, if they are deprived of or have access to livelihood assets. But in a coupled human-environment system in which wildlife tourism is a part, vulnerability is not only about humans, but can apply also to

wildlife species, and their habitat/environment (Williams et al. (2008). In this study these have been categorised as *environmental specific* sensitivities.

In assessing sensitivity it is important, however, to understand that while exposure is determined by both intrinsic and extrinsic factors, sensitivity are determined by factors that are intrinsic to the studied unit/system (Williams et al., 2008). And sometimes it is difficult and challenging to assess the intrinsic factors (Williams et al., 2008). For instance, Williams et al. (2008) revealed that the sensitivity of a wildlife species is determined by the species' intrinsic factors such as the physiological tolerance limit, genetic diversity and behavioral traits. Given this revelation, the assessment of species' intrinsic factors remained outside the scope of this thesis. Rather, this study focused mainly on environmental factors that can influence wildlife's exposure to shocks and stressors.

Adaptive capacity

Adaptive capacity is defined as 'the ability of a system to adjust to climate change variability and/or extremes to moderate potential damages or cope with consequences and to take advantage of opportunities climate change may bring' (IPCC, 2007a, p. 869). It determines the potential or ability of a system, region or community to adapt to the effects or impacts of climate change (Smit & Pilifosova, 2003; Smit & Wandel, 2006). Therefore, knowledge of the adaptive capacity of a given system or any other unit of analysis enables a researcher to conclude whether such unit is vulnerable or resilient to climate change (Adger et al., 2005). It can be argued that from this knowledge the researcher may decide what types of adaptation interventions are appropriate to improve the adaptive capacity of a studied unit.

Like vulnerability, adaptive capacity is a highly dynamic and context specific concept as it varies across countries, communities, societies and individuals over time and space (Adger et al., 2005; Klintet al., 2012a; Smit & Wandel, 2006). The adaptive capacity is influenced by many factors but the commonly cited ones include: the appropriateness of a prevailing social institution and education (Jopp et al., 2010); and prevailing economic situations, people's access to natural resources, existing social networks, land entitlements, governance, human resources and technology (Calgaro et al., 2013a, 2013b; Smit & Wandel, 2006). In a situation where the adaptive capacity is considered

low, these factors can be manipulated to improve the capacity (Smit & Pilifosova, 2003).

There is a close relationship between adaptive capacity and sustainable development. According to Smit & Wandel (2006), enhancement of adaptive capacity involves similar requirements to those of enhancing sustainable development, such as: improving access to resources; reduction of poverty; improving intra- and inter-generational equity; respect of accumulated local experience; active participation of concerned stakeholders; and improved institutional capacity and efficiency. Therefore, enhancing the adaptive capacity of communities represents a practical means of not only helping these people cope with climate change uncertainties, but also enhancing their sustainable development (Smit & Pilifosova, 2003). In a coupled human-environmental system, climate change will escalate the use of natural resources which are key inputs for tourism (Chomba & Siamudaala, 2013; Mwiturubani & Van Wyk, 2010) making tourism vulnerable. Therefore, it can be argued that the enhancement of peoples' adaptive capacity by providing them with alternative resources in order to reduce over-dependency on natural resources will consequently reduce vulnerability of tourism to climate (Smit & Pilifosova, 2006).

Adaptation

Adaptation to climate change has been defined as adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their associated impacts (IPCC, 2007a; Leary et al., 2008; Smit & Pilifosova, 2003; Smit & Wandel, 2006). It is a way of dealing with unavoidable consequences of climate change in the short-and long-term. It involves adjusting processes, practices, behaviours and structures to moderate potential damages or to benefit from opportunities that climate change may bring (Jopp et al., 2010; Smith, 2006). Adaptation represents a practical means of increasing tourism resilience through enhancement of adaptive capacity, as it can be used to formulate tourism related policies and public interventions, necessary for national and local communities (IPCC, 2007a; Leary et al., 2008; Smit & Pilifosova, 2003; Smit & Wandel, 2006). Thus, adaptation is considered as an important factor for enhancing sustainable tourism development (Jotzo et al., 2009).

Resilience

Resilience is another important concept that is used frequently in climate change studies. It is an approach used to study the dynamics of a complex coupled human-environment system, like wildlife tourism (Folke et al., 2010). As shown in Smit and Wandel (2006) and Gallopín (2006) resilience has been used interchangeably with adaptive capacity. Although the concept of resilience will be used less frequently than the adaptive capacity in this thesis, the purpose of introducing this concept in this thesis therefore is to highlight its distinction from adaptive capacity.

The resilience concept, although having its origins in ecology, has been applied to many fields of study including business, engineering, material science and psychology (Hudson, 2010), sociology (Klein, 2001; Klein, Nicholls, & Thomalla, 2003) and climate change (Calgaro, 2013a; Williams et al., 2008). It is not the scope of this thesis, however, to present all the definitions of resilience, rather this thesis will focus on ecological, societal and climate change definitions. In ecology or ecosystem studies, resilience has been broadly defined as ‘the capacity of an ecology/ecosystems, individuals, or organisations to cope with stresses and retain or subsequently regain functional capacity and form’ (Hudson, 2010 p. 12). In this respect, the concept is used as an umbrella term for addressing the degree of sustainability (or adaptive capacity) of a coupled human-environment system (Adger, 2000; Adger et al., 2003, 2005, 2007, 2009; Jayaraman, 2004; Klein et al., 2003). In social studies, resilience implies the ability of a society or community to resist, absorb and/or recover from shocks or stressors in a timely and efficient manner, while preserving or restoring its essential basic structures, functions and identity (Dazé, Ambrose, & Ehrhart, 2009). In climate change studies, resilience concepts reflect a system’s ability to reorganise after it has been impacted by climatic shock or stressor events, and its ability to build capacity to learn and adapt (Adger et al., 2005). Resilience is a subset of adaptive capacity, denoting “a state of being”... while adaptive capacity denotes a “process” (Gallopín, 2006).

2.3.2 Tourism vulnerability to climate change

The substantial literature acknowledges that the world climate is changing and will affect all sectors of the economy (Bigano et al., 2005; IPCC, 2001, 2007a; Scott et al., 2008; Stern, 2007). As previously mentioned, tourism is one of the sectors highlighted

as being vulnerable to climate change (Becken, 2007; Bows et al., 2009; Cabrini, 2010; Moreno & Becken, 2009; Scott et al., 2012; Viner & Agnew, 2009). Climate change is associated with the alteration of weather parameters, such as temperature, precipitation, clouds, fog, wind and humidity, which are a part of tourism (Nyaupane & Chhetri, 2009). Impacts such as warmer temperatures, increasingly frequent and intense storms, droughts, cyclones, sea level rise and heavy precipitations associated with floods present a range of climate change consequences for tourism destinations (Cabrini 2010; Gössling et al., 2009; IPCC, 2011; IPCC, 2007a; Scott, 2012; Scott et al., 2008). Tourism is vulnerable to climate change because its product stems from climate (Becken, 2009; Buzinde et al., 2010; Hambira et al., 2013; Martín, 2005; Moreno & Page, 2012a, 2012b; Page, Song, & Wu, 2012). In some destinations, for example, climate is the major tourist attraction (Buzinde et al., 2010; Hambira et al., 2013; Moreno & Becken, 2009). In other destinations, most tourism attractions, such as wildlife, natural landscapes and scenery to mention a few, are supported by climate (Gössling et al., 2009; Scott, Freitas, & Matzarakis, 2009). These relationships clearly demonstrate that any change in climate may impose significant impacts on tourism and hence the sector must adapt to climate change (Bigano et al., 2005).

There are a number of interconnected processes (in space, time and scale) that cause these impacts (Pearman, 2008). Climate change scientists associate global climate changes with anthropogenic processes (Cabrini, 2010; IPCC, 2001, 2007a; Viner, 2006). The scientists purport that the Earth's climate is changing due to global warming as a result of increasing interactions between human beings and environmental processes (IPCC, 2007a). The literature ascertains that for decades, human activities involving extraction and use of fossil fuels, and changes in land management practices including land clearing have escalated the emission of greenhouse gas (GHG) and this has a strong connection with climate change (Becken & Hay, 2007; IPCC, 2007a; Preston et al., 2006; Scott, 2012). Climate change scientists predict that even if GHG emissions stabilise in future, global warming will escalate into the future due to the time scale of past emissions and feedback mechanisms (Becken & Hay, 2012; IPCC, 2007a; Scott et al., 2008). This suggests that both short- and long-term practical initiatives to reduce (if not to avoid) the consequences of climate change are required for tourism to grow sustainably.

Worldwide, all regions, nations, tourism and associated subsectors will be impacted differently by climate change (Jopp, 2012; Simpson et al., 2008; UNWTO-UNEP-WMO, 2008). However, some nations, and tourism subsectors (e.g. wildlife tourism, beach tourism, mountain tourism, e.t.c.) will be more vulnerable while others may benefit from climate change (Simpson et al., 2008; UNWTO-UNEP-WMO, 2008). In terms of nations, the IPCC (2007a) concluded with high confidence that African nations are among the most vulnerable to climate change because of low adaptive capacity. Regarding tourism subsectors, very often the most vulnerable sub-sectors and destinations are those that rely heavily on natural attractions – e.g. the entire nature-based tourism and all its segments such as wildlife tourism (Jopp, 2012; IPCC, 2007a). Relying on natural attractions combined with low adaptive capacity makes tourism in Africa even more vulnerable to the impacts of climate change (IPCC, 2007a; Gössling et al., 2006). Nevertheless, all tourism subsectors regardless of their vulnerability degrees will need to adapt in order to minimise potentially negative climate change risks (Simpson et al., 2008).

2.3.3 Tourism adaptation to climate change

Adaptation and mitigation are the two broad options available in the literature, to manage short- and long-term risks of climate change. Mitigation aims at reducing GHG emissions with the goal of slowing or preventing climate change; whereas adaptation aims at reducing the adverse effects of global warming through adjustments of services, behaviours e.t.c (Hambira et al., 2013; Kelly & Adger, 2000; Sanderson & Islam, 2007). Adaptation is a necessary and complementary action to mitigation (IPCC, 2007a). Mitigation and adaptation can sometimes occur simultaneously (Scott, 2012). However, due to differential vulnerabilities, different tourism subsectors will have to design different adaptation strategies to suit their specific vulnerability contexts (IPCC, 2007a).

In most cases, different nations engage in sustaining particular tourism products, which have strong competitive advantages over others (Francis, 2012). For instance, most Eastern and Southern African countries are best placed in offering tourism products, stemming mostly from their unique natural resources such as wildlife (Francis, 2012). For these countries to maintain their competitiveness in tourism they need to formulate and implement adaptation actions necessary to sustain natural resources (Hambira et al.,

2013). However, should this kind of adaptation fails to sustain the existing tourism product, adaptation requires some degrees of flexibility, willingness to modify the product, or even to seek alternative product in order to sustain the local tourism industry (UNWTO, 2008a). To achieve this, wildlife tourism stakeholders will need to have thorough understanding of wildlife tourism features, and patterns of vulnerability to climate change challenges (Higginbottom, 2004; Preston-Whyte, & Watson, 2005) in order to indentify the most vulnerable features, extent of vulnerability and alternative products.

2.4 Wildlife tourism features

Wildlife tourism is increasingly becoming a popular form of leisure and recreation worldwide (Hambira et al., 2013; Newsome et al., 2005; Rodger et al., 2009). It provides tourists with opportunities to view and interact with wild animals in diverse environmental settings (Ballantyne, Packer, & Sutherland, 2011; Haines-Young & Potschin, 2008; Hamilton, Maddison, & Tol, 2005; Higginbottom, 2004b; Higham & Bejder, 2008; Higham & Lück, 2008; Higham & Lusseau, 2007; Rodger, Moore, & Newsome, 2007). The settings are classified as captive, semi-captive and/or free range in the animal's natural environment (Higginbottom, 2004a; Newsome et al., 2005; Newsome & Moore, 2012). Most of wildlife tourism activities take place in protected areas.

In Africa, protected areas serve as the most important sites for visitors to view wildlife (Hambira et al., 2013; Okello & Yerian, 2009). A protected area is 'a clearly defined geographical area that is recognised, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values' (available in <http://www.iucn.org>, visited on 19/03/2014). Becken and Hay (2007) asserted that 'visitors are attracted to protected areas (of Africa) because they represent a healthy environment and natural resources that are protected in perpetuity' (p. 242). The initial focus of PAs creation and management was to protect species and habitat but in recent decades PAs have seen tourism included in PAs management (Becken and Job, 2014; Kideghesho, 2010; Sinclair, 2005). The abundance of protected wildlife and the geography of most African countries allow the viewing of wildlife in close proximity, and this plays a significant

role in attracting tourists (Melita, 2011). In addition, the presence of the so-called ‘big five’ animals (lions, elephants, rhinoceros, buffalos and leopards) increases the attractiveness and competitiveness of African wildlife tourism, and hence adds more value to tourists’ experience (Newsome et al., 2005; Preston-Whyte & Watson, 2005). Creation of protected areas has long been viewed as the most feasible strategy to enhance the sustainability of wildlife tourism by ensuring that neither overharvesting nor habitat loss leads to depletion of wildlife resources (Kideghesho, 2010). However attaining this has been a challenge due to many factors including the involvement of stakeholders with varying goals and interests.

Wildlife tourism involves a wide range of stakeholders including visitors who have varying goals and interests. A wildlife tourism stakeholder is any person or a group that is involved in, or may be affected by, any wildlife tourism activity (Tapper, 2006). As climate change is highly uncertain, people with varying goals and interests may respond irrationally and differently to information about uncertainty and potential negative outcomes of climate change (Few, Brown, & Tompkins, 2007; Gardner et al., 2009). This may lead to adaptation failure or maladaptation problems (Adger et al., 2003). This is because the way people receive and process new information is strongly influenced by their existing attitudes, and these in turn influence their interests and goals (Gardner et al., 2009). Understanding wildlife tourism stakeholders is an essential ingredient in ensuring that the problems arising from inconsistency in goals and interests, as a result of inconsistent attitudes among stakeholders, are minimised (Gardner et al., 2009). Minimising these problems involves engaging stakeholders who feel personally vulnerable, capable of responding to, and considers themselves as having some degree of responsibility for the problem (Moser, 2007). Table 2-4 presents key wildlife tourism stakeholders, and their varying goals.

Table 2-1 Key wildlife tourism stakeholders

Stakeholders	Primary goals/expected benefits from wildlife tourism
Visitors	<ul style="list-style-type: none"> • Access to affordable, high quality wildlife tourism experience • Learn local cultures and experiences.
Tourism business operators (lodges/resorts and tour guide companies)	<ul style="list-style-type: none"> • Promotion and advertisement of wildlife tourism product, • Maximise short term profits to individual operators and members of travel trade. • Provide high quality tourism operations and experiences.
Government agencies;	<ul style="list-style-type: none"> • Policy formulation and enforcement.

including research and training institutions	<ul style="list-style-type: none"> • Promoting and advertising wildlife tourism.
Host communities (indigenous and community surrounding parks)	<ul style="list-style-type: none"> • Protect environment and maximise profits from wildlife tourism. • Increased access to natural resources (water, grazing/agricultural land and forests. • Improved livelihoods and wellbeing. • Involvement in decision making. • Compensation of lost property caused by wildlife/tourism/conservation.
Conservationists and environmental managers	<ul style="list-style-type: none"> • Minimise threats to wildlife resources. • Satisfy public recreation goals. • Use tourism to support conservation goals. • Law enforcement in protected areas. • Participation in policy formulation and enforcement.
Non-government organisations (NGOs)	<ul style="list-style-type: none"> • Protection of wildlife habitat, biodiversity and the general environment. • Provides supports (such as water projects) to local communities. • Use tourism to support conservation goals.
Wildlife	<ul style="list-style-type: none"> • Generally it is assumed that the interests of wildlife are reflected among the goals of Conservationists, environmental managers and NGOs and they involve protection of wildlife and their habitat from negative consequences of tourism.

Sources: Higginbottom (2004, p.126), Taper (2006, p. 19).

Furthermore, due to variations in goals and interests, wildlife tourism involves visitors who engage in different wildlife tourism activities. Based on users' goals, preferences and interests, activities that wildlife tourists may engage in have broadly been classified as *non-consumptive* and *consumptive* (Newsome et al., 2005). Non-consumptive activities include viewing or interacting with free-ranging wild animals and birds through photographing, touching and/or feeding them. Consumptive wildlife tourism involves activities such as killing or capturing animals or birds in their natural terrestrial environments and/or recreational fishing in the aquatic environment (Ballantyne, Packer, & Hughes, 2009; Ballantyne et al., 2007, 2011; Higginbottom, 2004b; Lovelock & Lovelock, 2008; Lovelock & Robinson, 2005; Newsome et al., 2005). The activities may also involve learning about wildlife ecology and historical perspectives that explain the human–wildlife interactions (Newsome et al., 2005). Tourists' engagement in different activities may cause different impacts on wildlife species and their habitat thereby subjecting PAs to different management requirements, which may result into increasing management costs (Newsome et al., 2005; Okello & Yerian, 2009). Climate change may exacerbate these impacts causing PAs management to become even more complex and challenging (Preston-Whyte, & Watson (2005). Furthermore, high costs of

PAs management may reduce the expected profit from wildlife tourism making the attainment of sustainable development more challenging (Becken & Hay, 2007). Thus, understanding tourists' decision making behaviour is essential for management and climate change adaptation planning, although it is not part of this study.

In summary, this section has highlighted that wildlife tourism is a sector often regarded as complex, unpredictable, and susceptible to a wide range of unforeseen negative impacts. With respect to the impacts related to climate change, wildlife tourism may become vulnerable because it comprises various factors that increase its exposure and sensitivity to climate change: (1) it takes place in a diversity of ecosystems, which are often considered delicate and fragile and therefore very sensitive to negative climate change impacts (Becken, 2007); (2) it involves various stakeholders with varying goals, insufficient or no knowledge and interests in managing climate change impacts (Calgaro, 2011; Calgaro & Lloyd, 2008) including limited knowledge of disaster preparedness (Becken, 2007); (3) it is highly dependent on international tourist markets; (4) the core values (conservation, animal welfare, visitor satisfaction and community development) upon which wildlife tourism rests are always in conflict (Reynolds & Braithwaite, 2001); and finally, (5) it operates as a complex system which is open to various external factors including climate variability and change, terrorism and global economic crises (Becken, 2007). However, the entire consequences of these factors for wildlife tourism vulnerability depend on the nature or context of the system considered. Therefore, in the era of climate change, conducting research that is underpinned by the requirements to understand the contextual vulnerability of wildlife tourism in PAs along with identifying factors and processes that perpetuate vulnerability are some of the very important issues for researchers to focus (Scott, Jones and Konopek, (2006).

2.4.1 Wildlife tourism vulnerability to climate change

Studies examining the consequences of climate change for wildlife tourism provide insights into how climate change will impact wildlife tourism worldwide (Nyaupane & Chhetri, 2009; Scott et al., 2008, 2012; Scott, Jones, & Konopek, 2007; Scott & Lemieux, 2005). Nyaupane (2009) highlights that change in any of the climate parameters in the Himalayas can affect wildlife and reduce tourism flow by altering the

attractiveness of this destination. In Canada, climate change scientists predict climate change will cause habitat fragmentation which in turn will negatively impact the abundance and diversity of wildlife in the mountain parks (Scott, cited in Nyaupane & Chhetri, 2009). Nyaupane (2009) predict similar impacts for biodiversity in Yellowstone National Park in the United States of America (USA). Some climate change scientists predict that one-third or more of global wildlife species will be at risk of extinction from future climate change events (IPCC, 2007a; Resosudarmo & Jotzo, 2009). Nyaupane (2009) reports that in the USA, a regional warming of only 3°C will lead to over 3% loss of mammal species in mountain ranges, and three to four mammal species will become extinct in the region. Weather extremes, such as increased frequencies, severity and duration of droughts, are said to be the principal consequences of climate change for wildlife and this will profoundly impact tourist flow (Nyaupane & Chhetri, 2009).

Other scientists further predict that climate change will create unfavourable environmental conditions that may affect tourist flow. Simpson et al. (2008), Scott (2012) and Scott et al. (2008) purport that climate change will create environmental conditions that favour the emergence of persistent vector-borne diseases and these can have significant implications for destination competitiveness. Moreover, climatic change will affect many aspects of the natural environment including landscapes and essential services to attract visitors (Gössling et al., 2006; Scott et al., 2012). Such changes will also have indirect effects on some cultural heritage assets that are essential for tourism in some wildlife destinations (Scott, 2012; Scott, Gössling et al., 2012). Consequently, alteration in the wildlife tourism resources may create a complex and dynamic responses from both wildlife tourism managers and visitors (Hambira et al., 2013). These responses may involve modification of the tourism product to maintain its attractions for visitors, and on the other hand visitor may continue visiting the destination if the attractiveness has been maintained or may opt to shift to a more attractive destination (Hambira et al., 2013). However, Scott (2012) and Scott et al. (2012) report that the perceptions and responses of visitors toward environmental changes as a result of climate change are not well understood, suggesting further research is needed.

Climate change will also affect local communities living within or adjacent to protected areas (Becken, 2007). The social, political, economic and environmental factors that often compel these communities to become vulnerable to climate change determine the ways these communities use immediate natural resources. The use of these resources may be to the advantage or disadvantage wildlife tourism. It may be a cost to wildlife tourism because according to Ashley (2009) and Becken and Hay (2007), very often poor people tend to over-utilise the nearby natural resources to cope with adversity if they cannot access other livelihood resources. It may advantage wildlife tourism if some community members decide to migrate to other areas where there are plenty of livelihood resources. African wildlife tourism will, arguably, be the most sensitive to this type of impact because the communities surrounding PAs have limited access to livelihood assets and thus are highly vulnerable to climate change.

2.4.2 African wildlife tourism vulnerability to climate change

As said previously, wildlife tourism is one of the very crucial means for enhancing sustainable development in Eastern and Southern Africa (Gereta, 2010; Higginbottom, 2004a; Kideghesho, 2010). However, climate change has the potential to negatively impact wildlife tourism and, hence, can limit wildlife tourism's contribution to sustainable development. The impacts of climate change on wildlife tourism are directly and indirectly linked to variations in precipitation, temperature, humidity (Scott et al., 2008, 2012; Simpson et al., 2008) as well as landform transformations resulting from increased encroachment and activities associated with human habitation (Ngaruiya, 2009; URT, 2008). Variations associated with precipitation, temperature and humidity can lead to the occurrence of extreme events such as increased maximum temperatures, longer and severe droughts, more floods, more hot days, more or reduced precipitation intensities, greater tropical storm intensity, hurricanes and higher maximum humidity (IPCC, 2007a; Newsome et al., 2005). It is important to note, however, that these changes may also occur as a result of climate variability rather than change (Preston-Whyte & Watson, 2005). Similarly, other non climatic factors associated with landform transformations due to increased encroachment from human habitation and mass tourism (Higginbottom, Green & Northrope, 2003; Sinclair et al., 2009; Ogutu et al., 2009) can be exacerbated by climate change and variability leading to increased vulnerability of wildlife ecosystem and associated tourism.

However, there will be intra-regional variations of vulnerability caused by these impacts due to the fact that vulnerability is a context and place specific (Smit & Pilifosova, 2003). For example, the scientists speculate that increased maximum precipitation will occur in East Africa (Eriksen et al., 2008; Eriksen & Watson, 2009; Gössling, Peeters, & Scott, 2008; Simpson et al., 2008) and drier conditions will be evident in large parts of Southern Africa because of low precipitation (Hulme et al., 2001; Newsome et al., 2005). Furthermore, the scientists predict that warmer temperatures will continue in these regions and will lead to increased evaporation and transpiration. All these arguments stress on understanding the contextual vulnerability of climate change.

Given that vulnerability is context and place specific, it is arguably worthy saying that these changes will affect differently the major components of the wildlife tourism system: wildlife and habitat, tourism enterprises, local communities and tourists, as explained in the following subsections.

Impacts of climate change on wildlife and habitat

African wildlife tourism is vulnerable to climate change primarily because major attractions for wildlife visitors are located in fragile ecosystems (Becken, 2007; Eriksen et al., 2008; Eriksen & Watson, 2009; Hambira et al., 2013; IPCC, 2007a; Ngaruiya, 2009; Scott et al., 2008). Ecosystem fragility means that wildlife ecosystems contain conditions, as mentioned in section 2.4, which expose tourism attractions to climate change (Nyaupane & Chhetri, 2009). Climate change will alter the integrity of ecosystems by reducing the production of wildlife and the plants they feed on and this may lead to the extinction of some African wildlife species (Eriksen & Watson, 2009; Frändberg, 2005; Hambira et al., 2013; Ngaruiya, 2009; Tervo, 2008; Twomlow et al., 2008).

Altered water availability is another consequence of climate change for wildlife in African protected areas (Hulme, cited in Newsome et al., 2005). Water availability is associated with temperature and the amount of precipitation falling in an area in a given time period (Estes & Atwood, 2006). While low precipitation and warmer temperatures may lead to less water availability and increased aridity in some protected areas, higher maximum precipitation may cause floods, leading to damage of infrastructure and habitat necessary for wildlife tourism (Jordan et al., 2008; Simpson et al., 2008). In

South Africa, an increase in temperature by 2.5°C by 2050 is associated with increasing aridity conditions (Preston-Whyte & Watson 2005). This coupled with the shift in precipitation will lead to a decline of half the current level of wildlife (Becken, 2007). Preston-Whyte and Watson (2005) predicted that by 2050, the flow of water in the Zambezi River in southern Africa will be diminished due to 15% less rainfall, 25% more evaporation and 40% less runoff from catchment areas. According to these authors, these effects will consequently impact the savannah vegetation and wildlife which consequently lead to extinction of some plant and wildlife species.

The literature on climate change points out that wildlife extinction may have profound impacts on the sustainability of wildlife tourism in Africa (Eriksen & Watson, 2009; Hambira et al., 2013; Jones & Thornton, 2009; Murray-Hudson, Wolski, & Ringrose, 2006; Prato, 2008). Climate change scientists estimate that 25% to 40% of mammals in African protected areas will be endangered or extinct due to climate change by 2080 (Parry et al., 2010). Some researchers have concluded that because wildlife is a critical resource for tourism (in Africa), any effect that will lead to reduction of their abundance or loss of species will likely affect visitation in many wildlife tourism destinations (Gössling et al., 2012; Scott et al., 2012). Consequently, Africa's wildlife tourism will have to adapt to climate change in order to maintain tourist flow (Preston-Whyte & Watson, 2005).

There is an indirect effect of climate change on wildlife destinations as a result of increased human activities within and around protected areas (Brown, Valone, & Curtin, 1997; Browne & Hunt, 2007; Ogutu, Piepho, Dublin, Bhola, & Reid, 2009; Sinclair et al., 2009). These activities will create environmental conditions that expose wildlife and their habitat to climate change, and further restrict migration of wildlife and facilitate inbreeding (Sinclair et al., 2009; Ndibalema, 2010). There are also impacts caused by tourists on wildlife and ecosystems, especially if the number of tourists exceeds carrying capacity of a destination (Higginbottom, 2004). Similarly, as tourism involves the movement of tourists from source markets to destinations (Becken, 2007; Hall, 2010), this constitutes a major source of GHG emissions that contribute to global warming, which in turn may affect wildlife and ecosystems. The movement of tourists can also facilitate transferring exotic material (both fauna and flora) and diseases from source markets or transit regions to destinations (Hall, 2010). Similarly, movement of

tourists including how they access wildlife in order to view, touch or feed them, may degrade the ecosystem as well as cause significant disturbance, thereby affecting the health and welfare of wildlife (Hall, 2010; Higginbottom, 2004a). All these conditions may exacerbate the impacts of climate change on wildlife and their habitat, leading to extinction or loss of some wildlife species. Consequently, this will affect wildlife tourism.

In East Africa and Southern Africa, climate change is already affecting wildlife resources. In Kenya, for example, Ngaruiya (2009) reported that in December 2009 elephant, zebra and wildebeest populations suffered huge losses due to severe drought. According to the study conducted by Hambira (2013) in Southern Africa, climate change is already affecting wildlife in the seasonal flood zone of the Okavango Delta. Hambira concludes that in the near future, climate change will affect migration of some of these wildlife species, and this may lead to their extinction (Hambira, 2013). Despite this fact, little research has examined the potential impacts of lost (wildlife) species (in Africa) that serve as a major visitor attraction (Preston-Whyte & Watson, 2005; Scott et al., 2012). Furthermore, despite this fact, there has been no framework designed to address climate change adaptation in wildlife tourism. Therefore, there is an urgent need to develop a framework to aid climate change adaptation process in order to prevent further loss or extinction of Africa's wildlife.

Impacts of climate change on tourism businesses

Climate change will reduce the profit expected by tourism enterprises and their capacity to do business sustainably (Scott, 2012). However, as explained previously, vulnerability differs from one business to another and from one location to another. The literature on climate change in Eastern and Southern Africa highlights that climate change is already affecting some of the tourism enterprises. For example, in Kenya climate change is already imposing negative consequences for some tourism enterprises in some wildlife destinations and tourists are challenged in choosing to visit those destinations (Ngaruiya, 2009). In Botswana, higher temperatures are already affecting some nature-based activities such as scenic flights, recreation canoeing and boating (Hambira et al., 2013). Although Hambira and colleagues did not find out any reduction in revenues caused by climate change impacts, business owners are aware of the future vulnerability of their businesses. According to Hambira et al. (2013), most

accommodation and safari operators were of the view that increased temperature and aridity would force wildlife to migrate to more favourable locations, thereby creating a huge loss of revenue in wildlife's origin areas. However, despite significant awareness among wildlife tourism business operators, Hambira and colleagues did not report any adaptation strategies developed by operators to prevent their businesses from the future impacts of climate change. Thus, understanding how tourism businesses can adapt to climate change is essential for sustainable wildlife tourism development.

Impacts of climate change on local communities

Literature about local community vulnerability to climate change is substantial (Adger, 2006; Becker, 2014; Cutter, Boruff, & Shirley, 2003; Kates et al., 2001; Parkins & MacKendrick, 2007; Scott, 2012). The literature acknowledges that the local vulnerability – to climate change – is an integral component of sustainable tourism development (Shen, Hughey, & Simmons, 2008). The literature link community vulnerability to climate change with poverty which is, in turn, linked to the application of weak livelihood strategies (i.e. low adaptive capacity) in dealing with many factors that perpetuate vulnerability (DFID, 1999; Calgaro et al, 2014; DFID, 1999). The literature purports that climate change will further exacerbate the already stressed livelihoods (Smit & Pilifosova, 2003; Smit & Wandel, 2006). In a situation where the local community share ecosystem resources with tourism, stressed livelihoods raises question as to how the community will use the immediate natural resources to adapt, and what will be the consequence of this to tourism. Understanding local community livelihoods is therefore an essential part of understanding community's vulnerability and increasing the community's adaptive capacity (Carney, 1999).

The Sustainable Livelihood Framework (SLF) (Figure 2-1) is a framework put forward by the Department for International Development (DFID) (1999) aimed to providing a tool for understanding community's livelihoods, vulnerability and outcomes of the community's livelihood strategies. The DFID (1999), put forward that 'livelihoods are shaped by multitude of forces (e.g. shocks, trends and seasonality) and factors (transforming structures and processes) and which are themselves constantly changing' (p. 2). As it is seen in Figure 2-1 the SLF consists of five interacting components: vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies and livelihood outcomes. The SLF suggests that the analysis of

community's livelihoods requires a simultaneous assessment of people's assets, the livelihood outcomes which they are seeking, and the livelihood strategies which they are adopting to achieve the outcomes. According to DFID (1999) the first component, vulnerability, is triggered by forces such as: shocks (human health shocks, natural shocks, economic shocks, conflicts, crop/livestock health shocks); trends (population, resource use, national/international economic, governance and technological trends); and seasonality. The second component, livelihood assets, is proposed based on a belief that people require a range of assets (also referred to as capitals): human, social, physical, financial and natural to achieve positive livelihood outcomes (Ashley & Carney 1999). Transforming structures (levels of government, private sectors) and processes (laws, policies, culture & institutions) is another important component of SLF. Transforming structures and processes play a big role in influencing the community's access to livelihood assets.

The SLF highlights that the combination of transforming structures and process, and community's livelihood assets determines the livelihood strategies (third component) the community adopts to achieve the livelihood outcomes (fourth component) (Ashley, 2000). However, it is important to note that no single category of assets on its own is sufficient to yield all of the livelihood outcomes that people seek, and thus people have to use the assets in innovative ways in order to ensure survival (DFID, 1999).

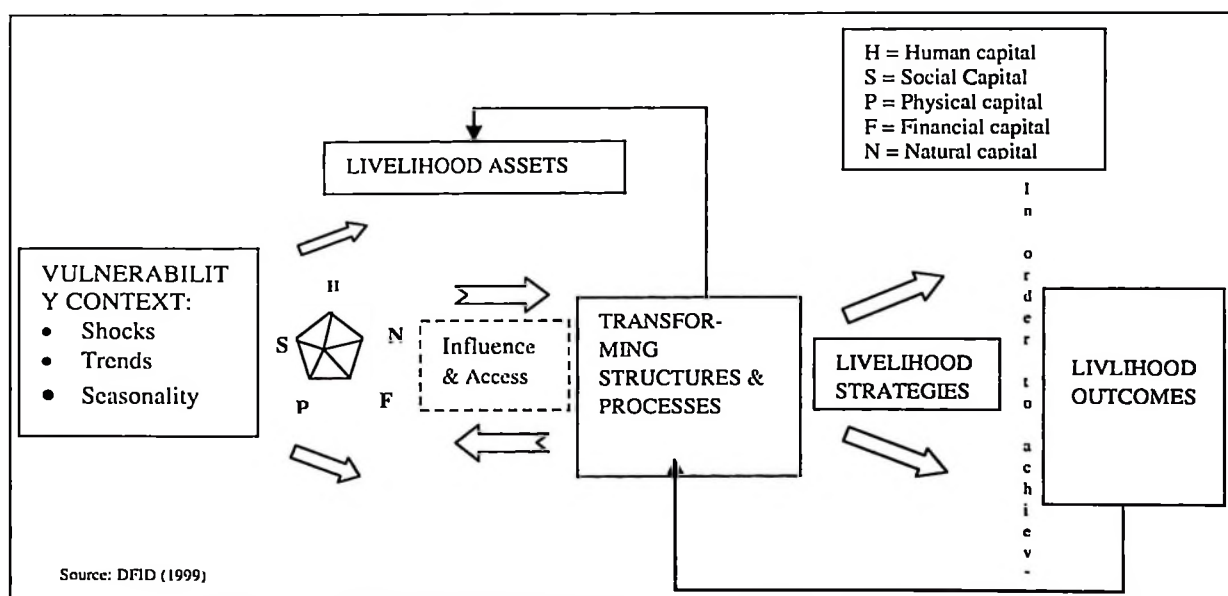


Figure 5-1: Sustainable Livelihood Framework

With respect to the impacts of climate change on local community in PAs, communities that depend on wildlife tourism will be impacted if climate change leads to a decline in visitors (Hambira et al., 2013). Similarly, climate change has the potential to affect the resource base upon which local communities derive their livelihoods (Gössling et al., 2008). Moreover, climate change will result in shortages of food, water and associated services necessary for local communities' wellbeing (Dunlop & Brown, 2007; Hannah, 2008; Hannah & Salm, 2005; Hannah et al., 2007). Smit and Pilifosaova (2003) reported that traditionally, local communities have used traditional means to cope with climate change impacts, particularly if the impacts are gradual but the communities are less adaptable and vulnerable when the frequency and magnitudes of the impacts are extreme. These consequences may influence the ways that people from the local communities use to choose certain actions over others (Calgaro et al., 2013) and this can have implication for immediate natural resources (Mitchell & Ashley, 2010) as well as wildlife tourism (Ngaruiya, 2009).

It is likely that affected communities will disrupt immediate wildlife resources in order to cope with climate change impacts. Mitchell & Ashley, (2010) reported that limited livelihoods – as a result of climate change –can accelerate poverty levels, resulting in increased pressure on natural resources. Encroachment of wildlife protected areas may be another social response to climate change. For example, Ngaruiya (2009) reported that severe droughts have amplified human–wildlife conflicts and human encroachment on some of the protected areas in Kenya. Increased pressures on natural resources may consequently lead to blocking migration corridors, loss of wildlife species and habitat and destination appeal to tourists (Becken & Hay, 2007). However, despite this fact, studies that examine the vulnerability of local communities to climate change and how this may affect wildlife tourism do not exist, suggesting that more research in this area is needed.

The role of transforming structures and processes which include institutions, organisations, policies and legislation is crucial in shaping livelihoods (DFID, 1999). These influence the community's access to assets necessary to improve livelihoods, the terms of business exchange and economic returns to any adopted livelihood strategy (DFID, 1999). In recent decades the government of various countries endowed with wildlife, like Tanzania, Kenya, Botswana and South Africa, implemented pro-poor

participatory programs such as Community Based Conservation (CBC) and Community Based Tourism (CBT) to increase people's access to natural and financial assets (Minwary, 2009). Although these programs were not designed explicitly for climate change, they have relevance for climate change adaptation as they increase community's adaptive capacity (Smit & Pilifosova, 2003). A study conducted by Sinclair et al. (2008) in Serengeti indicated that prevailing management policies in wildlife protected areas restrict local communities from accessing certain natural resources and areas, and land entitlements thereby increasing their vulnerability to shocks and other compounding stressors. In another study conducted by Minwary (2009) in Enduiment Wildlife Management Area, Tanzania, it was shown that most pro-poor participatory policies have not turned their objectives into reality, and this continue to perpetuate tension between government and people, poverty and vulnerability. Given that climate changes will escalate in future, this suggests that there will be negative responses by the stressed communities and this may have consequences for wildlife tourism.

Political instability and security risks are some of the negative social responses from communities impacted by climate change. Personal security is one of the primary factors that tourists consider when choose a particular destination (Scott, 2012). The literature presents that international tourists are highly averse to political instability, terrorism and social unrest (Hall, 2012). Increased political instability and other security risks may affect travel to African wildlife destinations by tourists who may opt to go to other destinations they perceive as safe (Ngaruiya, 2009). Security risks have been identified in a number of regions where tourism is critical to local and national economies (Raleigh, 2010; Scott, 2012) and where communities have limited livelihood diversification. Civil wars in some of the African nations (e.g. Rwanda, Somalia, Democratic Republic of Congo and North Africa) are some examples of security related risks that have affected tourist flow to Africa for the past two decades. The decline of tourism due to security related risks exacerbates the deterioration of African economies with a potential to undermine development objectives of some African countries that depend on wildlife tourism (Scott et al., 2012).

Moreover, climate change has the potential to affect the economic base of various countries (Gössling et al., 2008). For example, for countries that rely heavily on wildlife

tourism, a significant economic loss may be expected as a result of wildlife loss due to climate change. Some studies have estimated that by 2050, climate change will have led to a reduction of South Africa's Gross Domestic Product (GDP) by 1.5% due to the diminishing wildlife tourism industry as a result of climate change (Graham, 2009). These consequences will undermine the capacities of African countries dependent on wildlife tourism to achieve their developmental goals, such as poverty reduction. This may accelerate poverty, the associated rate of the destruction of protected wildlife resources and consequently affect tourism.

For most local communities from developing countries, vulnerability to climate change is associated with a few livelihood alternatives due to fragmented small economies, limited access to natural resources and unequal power relations (Cabrini, 2010; Calgaro, 2011; Calgaro et al., 2013a, 2013b). This is particularly the case for African communities living within or adjacent to protected areas. According to UNEP & UNWTO (2005), in order for local communities to be self-sufficient, there must be viable short- and long-term economic operations that ensure an equitable provision of social and economic benefits to all stakeholders, including stable employment, other income earning opportunities and/or social services to host communities, thereby contributing to poverty alleviation.

Impacts of climate change on tourists

Substantial literature has documented the effects of climate change on tourists (DeLacy, 2010; IPCC, 2007a; Scott et al., 2008; Scott, Gössling et al., 2012; Simpson, 2009). Mitigation policy is one of the mostly cited sources of impact on tourists. Mitigation assists in reducing carbon emissions and is projected to have negative effects on tourism through increased transport costs (Scott, 2012). Substantive literature has shown that the demand for long haul destinations (like those in Africa) will be highly affected by climate change than short haul destinations due to mitigation costs imposed on visitors (UNWTO-UNEP-WMO, 2008).

However, current advances in the literature on tourist behaviour towards mitigation policy have consistently indicated that currently proposed mitigation policies will have little impact on tourism demand (Becken, 2007; Gössling et al., 2006; Scott, Gössling et al., 2012). This is because many tourists do not consider climate change when planning

to travel (Becken, 2007; Hares, Dickinson, & Wilkes, 2010). Many tourists perceive that their freedom to travel has a higher priority than climate change and restricting this freedom is considered unacceptable (Becken, 2007; Gössling et al., 2006). Other tourists considered restrictions on their freedom to travel as an ‘infringement’ (violation) to their personal development (Hares et al., 2010). Scott et al. (2012) emphasise there is no evidence to suggest that current mitigation policies on long haul would have any potential impact on tourism demand through to 2020. A lack of significant impact of mitigation policy on tourists’ mobility may present an opportunity for African wildlife tourism to grow as usual, irrespective of climate change mitigation policy, if other factors remain constant.

2.4.3 Wildlife tourism adaptation to climate change

The literature reviewed in this chapter has shown that climate change is an obvious threat to the sustainability of wildlife tourism. Global warming will continue, even if GHG emissions are lowered through mitigation. Wildlife tourism will need to anticipate future climatic changes and adapt (Preston-Whyte, 2005). This in turn will improve the adaptive capacity of wildlife tourism, thereby reducing vulnerability to climate change (Dunlop & Brown, 2007; Gössling et al., 2009; Simpson et al., 2008). Adaptation allows wildlife tourism to grow sustainably and thus contributes to sustainable development. Given the complexity of wildlife tourism, the major challenge is to understand the degree to which wildlife tourism is vulnerable to climate change, so that appropriate adaptation strategies can be proposed to increase its resilience.

Adaptation represents a practical means of coping with changes and uncertainties of climate change (Smit & Pilifosova, 2003; Smit & Wandel, 2006). If well planned, adaptation helps to increase adaptive capacity and reduce the effects of exposure and sensitivity that different components of wildlife tourism may face. Planning adaptation strategies involves identifying ‘who’ or ‘what’ adapts, in the studied system, and developing adaptation strategies that are appropriate (Jopp et al., 2011). Calgaro (2011) points out that for adaptation to be effective, it should aim to reduce the vulnerability of all those involved in tourism. (For those involved in wildlife tourism, see Table 2-1. However, in the wildlife tourism sector, where there are many interacting stakeholders (see Tables 2-1), adaptation becomes a serious and challenging task to achieve. This is

because each of these stakeholders may present different vulnerability contexts as they may face different exposures, sensitivities and different adaptive capacities. This raises the question as to what types of adaptation are appropriate and effective.

2.4.4 Types of adaptation

Studies have shown that the effectiveness of adaptations adopted in enhancing the adaptive capacity of a system, community or sector depends on their types the context of application, who undertakes it and the type of climate stimuli (Jotzo et al., 2009; Smit & Pilifosova, 2003). Since this thesis is concerned with developing a framework for assessing vulnerability and adaptation, the point of interest for this sub-section is to assess the types of adaptation available in the literature in order to establish a theoretical base for the assessment. However, Füssel (2007) reports that there is no single approach for assessing, planning, and implementing adaptation measures given the diversity of adaptation contexts. Therefore the application of different methodological approaches to produce knowledge that is relevant for a particular context is encouraged.

There are various types of adaptation available in the literature (Adger, Huq, Brown, Conway, & Hulme, 2003; Füssel, 2007; Malik, Qin, & Smith, 2010; Smit & Pilifosova, 2003; Smit & Wandel, 2006). These are defined based on forms in which they occur (as presented in Table 2-2). However, the commonly cited adaptations include autonomous or spontaneous, planned reactive and anticipatory (Adger et al., 2003; Füssel, 2007; Malik, Qin, & Smith, 2010; Smit & Pilifosova, 2003; Smit & Wandel, 2006). Others include technical, business, behavioural, educational and research (Becken and Hay, 2007; Füssel, 2007; Hall & Higham, 2005; Jopp, 2012; Jopp et al., 2010; and Scott et al., 2009). A focus for this thesis is, however, on autonomous/spontaneous and planned adaptations, since other types of adaptations may fall within these two major types.

Autonomous or spontaneous adaptations can involve reactive responses (i.e. adaptation after initial impacts manifest) and can occur without government intervention (Smit & Pilifosova, 2003; Smit & Wandel, 2006). Smit and Pilifosova (2003) contend that ‘in unmanaged natural systems adaptation is autonomous and reactive; it is a process by which species, ecosystems and communities respond to changed conditions without public intervention’ (p. 879). Most sectors, including those involving human and natural

systems (such as protected areas), have been traditionally adapting autonomously to changes in average climatic conditions, particularly if the changes are within their coping range (Füssel, 2007; Smit & Pilifosova, 2003; Smit & Wandel, 2006). However, under extreme climate change conditions, autonomous adaptation may not be effective for communities and ecosystems and therefore government intervention (planned adaptation) is needed (Malik, 2010; Füssel, 2007).

Planned adaptation is regarded as a complement to autonomous adaptation (Füssel, 2007; Smit & Pilifosova, 2003). It can involve policy interventions, research and education, as well as changing governance transforming structures and processes. For human systems, ‘government intervention may be needed to encourage people to make both short –and long-term investment on adaptation or provide them with goods and services necessary to increase their adaptive capacity (Malik, 2010). The provision of meteorological information on future climate projections (Adger et al, 2003; Malik, 2010), research and development services, are supposedly the government’s responsibility and highly important to the success of autonomous adaptation (Malik, 2010). For natural systems planned adaptation can also be reactive (e.g. changing ecosystem composition) and/or anticipatory (e.g. early warning or soliciting incentives for relocation) (Smit & Pilifosova, 2003).

In wildlife tourism, such information about different types of adaptation is useful for communities, tourism business owners, managers and employees, government agencies, nongovernmental organisations (NGOs), and other tourism actors in developing climate change adaptation strategies. In this thesis such information will be a basis for assessing the current adaptation strategies available in NCA tourism system.

Table 2-2 Key adaptation forms and types

Adaptation forms	Types of adaptation
intent/Purposeful	<p><i>Autonomous adaptation:</i> referred also to as spontaneous adaptation, is adaptation undertaken without direct intervention of a public agency. It is triggered by changes in natural, market and/ or human systems.</p> <p><i>Planned adaptation:</i> Adaptation that is undertaken ‘as the result of a deliberate policy decision on the part of a public agency, based on an awareness that conditions are about to change or have changed and that action is required to minimize losses or benefit from opportunities’ (Pittock and</p>

	Jones in Malik et al., 2010 p. 3; Smit & Pilifosova 2003 p 884).
timing	<i>Anticipatory adaptation:</i> adaptation that takes place before the impacts of climate change are observed. It is also referred to as proactive adaptation. <i>Reactive Adaptation:</i> Adaptation that takes place after impacts of climate change have been observed.
agents	<i>Private Adaptation:</i> Adaptation that is initiated and implemented by individuals, households or private companies. Private adaptation is usually in the actor's rational self-interest. <i>Public Adaptation:</i> Adaptation that is initiated and implemented by governments at all levels. Public adaptation is usually directed at collective needs.
time scope	<i>Short-Run Adaptation:</i> The decision maker's response to climate change is constrained by a fixed capital stock, so that the principal options available are restricted to variable inputs to production (Stern, 2007). <i>Long-Run Adaptation:</i> The decision maker can adjust capital stock in response to climate change.
Required measures	<i>Technical:</i> Adaptation that requires the use of technology to determine appropriate strategies for coping with climate change impacts. <i>Legal:</i> adaptation that involves the enforcement of legal measures to reduce vulnerabilities. <i>Educational:</i> Often associated with actions that aim to educate communities, visitors and other tourism actors about adaptation and increase their ability to explore adaptation options. <i>Behavioural:</i> refers to the adaptation measures undertaken by individuals in the community, visitors or other tourism actors. <i>Research:</i> Adaptation that requires the development of research priorities in a coherent and coordinated ways. Research adaptation is important because it facilitates the implementation of effective actions for reducing climatic risks.

Sources: adapted from Becken and Hay, 2007 p. 48, 54, Fussel, 2007 p. , Hall & Higham, 2005 p. 79-83, Jopp, 2012 p. 38, Jopp et al., 2010 p. 595, and Scott et al., 2009, p. 179-187.

2.4.5 Adaptation implementation approaches

The choice of what approach to use in implementing adaptation strategies is also an essential element in determining the effectiveness of adaptation strategies in any system. The holistic or systems approach has been hailed as the most appropriate approach in managing complex systems such as wildlife tourism (Becken & Hay, 2007; Baggio, 2008; Spenceley, 2008; Zavaleta, 2009). There are many holistic frameworks that have been used in adaptation processes, but how effective these frameworks could be in wildlife tourism is less known.

Generally, the establishment and enforcement of protected areas, where most wildlife tourism takes place, has been considered by climate change researchers (Becken & Hay, 2007; Dudley et al., 2010) as the most appropriate adaptation strategy for wildlife tourism. This is because protected areas provide a wide range of conservation strategies designed for enhancing the sustainability of wildlife and their habitat, heritage sites and other attractions. Simpson et al., (2008) contend that these strategies have potential application for climate change adaptation as they can be promoted to enhance the adaptive capacity of wildlife tourism. However, other researchers (Becken & Hay, 2007; Heller & Zavaleta, 2009; Williams et al., 2008) have raised concerns that the existing strategies for managing protected areas are not sufficient to deal with climate change because they lack holistic nature.

Williams et al. (2008) pointed out that protected areas have, for many decades, relied on traditional (i.e. autonomous) conservation planning (similar to autonomous adaptation). According to Williams and colleagues these have been effective for that time only, but given the current rate of climate change, it will be impossible for traditional/autonomous approaches to ameliorate the impacts of climate change. Other scholars (Becken & Hay, 2007; Heller & Zavaleta, 2009) opine that the effectiveness of traditional conservation/autonomous strategies in enhancing the adaptive capacity of wildlife tourism under severe climate change is questionable. They consider the framework adopted in implementing traditional/autonomous conservation as not sufficient to enhance the adaptive capacity needed to ameliorate the impacts of climate change because it is not based on holistic perspective.

These scholars point out the weaknesses of traditional conservation strategies. According to Heller and Zavaleta (2009), current adaptation strategies available in protected areas are dominated by wildlife ecology. By concentrating on ecological adaptation, traditional conservation fails to capture vulnerability and adaptation associated with the human component of wildlife tourism. Furthermore, Becken and Hay (2007) assert that very often protected area management has been founded on frameworks that assume climatic and biogeographically stable. Becken and Hay (2007) consider this assumption as invalid, especially in the era of climate change. The assumption that protected areas have stable climates may prompt protected area managers to give little consideration, if not exclude completely, adaptation to climate

2.5 Chapter summary

This chapter has presented a review of the literature relevant to this study. The review started by providing a global understanding of the tourism concept including key issues underlying tourism research. It highlighted that attaining sustainable tourism development has been a key issue in contemporary tourism research. The literature identified climate change as one of the obvious threats in attaining sustainable tourism development. According to this review, all tourism subsectors (including wildlife tourism) will be threatened by climate change.

The key issue of interest for this study is that the reviewed literature revealed that wildlife tourism takes place mostly in protected areas (PAs). PAs offer good conservation strategies that are relevant for wildlife tourism adaptation to climate change. However, the existing model of managing PAs is criticised by various researchers as being ineffective to address adaptation to climate change in wildlife tourism. Wildlife tourism is a complex industry comprising both social and environmental systems as its main components. In the context of climate change, contemporary literature criticises the current PAs management framework as focusing mainly on ecological adaptation and largely ignoring the social component. In addition, the literature highlighted that even in ecological adaptation, climate change complexities are not clearly addressed in the current PAs management. The major reason for this is that most PAs managers tend to assume climate stability in PA. This assumption is based on the belief that there is nothing the managers can do beyond what they are currently doing to conserve wildlife. As a consequence, wildlife tourism lacks an effective climate change adaptation framework. Thus, there is an urgent need to develop an effective framework for climate change adaptation in wildlife tourism. It is important to note that the new framework is not intended to overrule the existing Pas management strategies, but rather strengthens them.

Furthermore, the literature review highlighted that the development of a conceptual climate change adaptation framework requires the researcher to: firstly, assess the vulnerability of a studied system; and, secondly, develop an adaptation framework based on vulnerability assessment data. The reviewed literature indicates that assessing the vulnerability of a complex system, such as wildlife tourism, is complex. As such

there should be a framework to guide it. The use of a framework to assess vulnerability helps a researcher to identify key issues from the field and serves as a basis for developing an adaptation framework. The following chapter presents the development of a theoretical framework that will be used to guide the assessment of vulnerability assessment in wildlife tourism.

CHAPTER THREE: SUSTAINABLE WILDLIFE TOURISM AND CLIMATE CHANGE ADAPTATION FRAMEWORKS

3.1 Introduction

As explained in Chapter Two, adaptation to climate change is an integral part of sustainable tourism development. Despite this recognition, the literature linking climate change adaptation to sustainability theory is rare. Scott, Lemieux, & Malone (2011) and Weaver (2011) are of the view that the way tourism currently addresses climate change does not necessarily favour sustainable tourism development. The literature on climate change adaptation offers no consistently agreed upon theoretical framework explaining the complex interplay between climate change adaptation and sustainable wildlife tourism development. As a result, the existing literature offers no sustainability basis from which adaptation can be built.

As highlighted in chapter one, the aim of this thesis is to review existing frameworks for climate change adaptation and their applicability to wildlife tourism, and if necessary, develop a new theoretical framework to assist wildlife tourism to understand and adapt to climate change. Since this objective is executed to develop a foundation for addressing sustainability of wildlife in the context of climate change, the purpose of this chapter, therefore, is twofold: (1) to build a theoretical understanding of existing frameworks for sustainable wildlife tourism and climate change adaptation and to identify the gap (if at all there is a gap); and (2) to use the information generated to propose a theoretical climate change adaptation framework suited for wildlife tourism. Reviewing such frameworks helps to understand the interplay between adaptation and sustainability. This interplay forms the theoretical foundation for developing a theoretical framework suitable for vulnerability assessment and adaptation to climate change in wildlife tourism.

3.2 Sustainable wildlife tourism framework

The concept of sustainable wildlife tourism development has been a topic of much debate in the literature over the past two decades (Ballantyne et al., 2011; Buckley, 2012; Higginbottom, 2004a; Newsome et al., 2005; Rodger et al., 2009). Higginbottom

(2004a) asserts that sustainability is a way of minimising long-term environmental costs that may arise as humans interact with nature. The major goal of sustainable wildlife tourism development is to ensure that wildlife tourism is pursued while simultaneously protecting it from negative impacts (both climatic and non-climatic), so that it continuously meets social, environmental and economic objectives of sustainability (Newsome et al., 2005; Rodger et al., 2011). Achieving this goal requires that tourism managers and academicians develop actions necessary to protect wildlife and wildlife habitat against negative impacts, maximise visitors' satisfaction, and provide social and economic benefits to local communities (Newsome et al., 2005; Rodger et al., 2011).

The development of actions for achieving sustainable tourism development is associated with challenges but development can be enhanced if certain issues are addressed (Buckley, 2012; Higginbottom, 2004a). Various researchers (Cooper & Vargas, 2004; Higginbottom, 2004; Wu, 2009) consider that identification and reducing the consequences of negative impacts are the most challenging issues for achieving sustainable wildlife tourism development. Without knowing how to identify immediate and potential impacts and without knowing how to reduce and prevent these impacts from affecting the three domains of sustainable wildlife tourism development: social, economic and environment tourism, achieving sustainability of wildlife tourism is questionable (Wu, 2009). There are substantial published studies on identifying and preventing wildlife tourism systems from various negative impacts (Buckley, 2012; Higginbottom, 2004; Newsome et al., 2005; Reynolds, 1999; Wu, 2009). Table 3-1 presents a list of negative impacts that, for many decades, these studies have been focusing. .

Table 3-1: Major impacts on wildlife tourism

Impact category	Causal factors
1. Wildlife loss	
Harvest/Death of wildlife	Activities like hunting and fishing cause the immediate deaths of some wildlife. These deaths may also be caused by collision with moving vehicles and/or feeding wildlife with poisoned food.
2. Wildlife habitat modification	
Clearing of vegetation	Vegetation clearing involves partial or complete removal of vegetation and the ecosystem which supports wildlife. This includes purposeful clearing of vegetation for development purposes such as road or house construction. Vegetation clearing may also affect water infiltration into the soil thereby

	escalating water shortages and droughts.
Changed plant composition	Clearing of wildlife habitat may cause loss of vegetation, thereby creating new environments favourable for exotic plant or animal species. This usually involves loss of native plant species and invasion by some exotic plant species. It usually results in a loss of resources used by native wildlife.
Reduced plant production	This impact may influence plant phenology (i.e. flowering and fruiting periods may be altered, thereby altering plant production levels). Inundation caused by flooding of a lake or river is another example. It may cause salt intrusion which impacts on non-tolerant communities.
Water shortage	Vegetation clearing and overuse of water by tourism industries and host populations may lead to a shortage of water for wildlife, tourism businesses and the host community in a national park. Consequently this may have significant effects on wildlife tourism. However, the impact of water shortage in protected areas is less studied compared to other impacts.
Changed plant structure	Thinning of trees, mowing and changing fire regimes are all intentional or unintentional management actions which can change the structure of plant communities and thereby alters its attractiveness to native wildlife.
3. Impacts caused by pollution	
Pollution	Intentional or unintentional introduction of harmful materials into animal habitat. Such materials may cause death or reduced health in animals.
4. Impacts related to wildlife disturbances	
Altered animal emigration	In addition to the factors highlighted in 2 and 3, tourists, in an attempt to access wildlife, may approach animals in a negative manner that creates disturbances. These disturbances can consequently affect animal migration. However, this is depends on perceptions tourists have on animals. For example, some tourists may perceive some animal species as dangerous or humble and this can influence the manner with which they approach the animals (Newsome et al., 2005).
Reduced animal production and reproduction	Generally, animals breed when they are in good health. Tourism activities may cause animal disturbance thereby decreasing the feeding time or increasing the energy expenditure. This condition is likely to affect the animal's health and cause a decline in its reproductive success.
Habituation	This is a condition where an animal learn not to respond to stimuli. It increases the ease of observation of animals by making them unnaturally tame to be approached by humans and may be encouraged by wildlife tourism managers. The learning process is, however, also a stress in that feeding time is lost and energy is expended in fleeing. Management of the process of habituation can be an important issue.
Animal dietary distortion	The feeding of animals by visitors may produce an imbalanced diet with vitamin and mineral deficiencies decreasing vitality and survival of animals.
Stereotyped behaviour	An animal in captivity may develop neurotic behaviours such as pacing. Presumably under less extreme situations, there are more subtle forms of modified behaviour.
Aberrant social behaviour	If the frequency of encounters between animals is increased by interaction with humans, this can have negative effects. When animals are attracted to an artificial food source, for example, the rate of agonistic behaviour can increase to artificially high levels with consequent loss of condition and threatens survival.
Increased exposure to predation	Disturbance of breeding animals can increase the risk of discovery of young by predators.

Modification of activity patterns	The activity patterns of animals are generally a compromise between the need for feeding and avoiding predation. It is well known that hunting pressure can cause animals to become more nocturnal, so presumably excessive human contact can do the same thing.
Altered community structure	If species leave an area or die out, then inevitably the species composition changes. This may have impacts on the remaining species. It may facilitate or allow exotic animal species to establish.

Sources: Buckley 2012, Newsome et al., 2005, Reynolds, 1999, and URT, 2010.

Wu (2009) suggests that identifying and preventing wildlife tourism from negative impacts has been enhanced by the use of conceptual frameworks (Wu, 2009). A conceptual framework is a group of concepts broadly defined and systematically organised to provide a focus, rationale, and a tool for the integration and interpretation of information (Mosby, 2009). However, a common criticism of sustainable tourism development is that there has been no consistently agreed upon theoretical framework from which the process of identifying and reducing negative impacts can be built (Cocklin, 1989; Wu, 2009). The inconsistency in theoretical framework is attributed to the contextual nature of the sustainability concept (Buckley, 2012; Spenceley, 2008). As a result, prevailing sustainable frameworks cannot be generalised on a global scale, but are adaptable to specific contexts (Wu, 2009). Given this pitfall, it can be argued that designing frameworks for identifying and managing negative impacts in wildlife tourism need to remain a continuous process and a central task of sustainable tourism researchers. It is important, therefore, to address contextual issues before initiating and implementing a sustainability framework. To address the issue of contextual differences, Jopp et al. (2010) argue that the development of a conceptual framework can come in any form given that the ultimate aim is to improve the framework applicability to as well as our understanding of complex interactions in a context considered.

Various authors have raised important requirements for the development of a sustainability framework: (1) it must be applicable across a wider context of wildlife tourism and should aim to fulfill social, economic and environmental goals of sustainable tourism development (Higginbottom, 2004a); (2) it must involve a wide range of stakeholders in order to ensure that sustainability actions are developed based on well informed and participatory decisions (Higginbottom, 2004a); and (3) it must address problems arising when stakeholders with different goals and interests interact to

achieve a common goal of sustainability (Newsome et al., 2005; Newsome & Moore, 2012). Moreover, for a framework to be effective, it must impart practitioners with sufficient knowledge for identifying, anticipating and managing both existing and new potential impacts (Agrawal & Chhatre, 2011). Developing such a framework requires theoretical guidance (Calgaro, 2010) that is verified through testing in the context considered. Otherwise, the theoretical framework or model can be used inappropriately and may lead to poor results (Wu, 2009).

The development of a framework for identifying and managing negative impacts in wildlife tourism systems need to include also an element of how to implement the framework. Based on the context considered, Higginbottom (2004a, p. 212) proposed the following key steps for implementing an effective sustainability framework: step one – setting sustainability *goals and objectives*; step two –*engage stakeholders* in all processes; step three – set the appropriate *indicators and standards* for measuring the objectives; step four – formulate appropriate impact *management actions*; step five – design a suitable *monitoring (and evaluation)* program; and step six –*document* the above process so it can be used to guide management. These steps are summarised in Figure 3-1. The authors (Clark & Stankey, 1979; Graefe, Kuss, & Vaske, 1990; Manfredo, 2002; Shelby & Heberlein, 1987; Stankey et al., 1985) have also presented how sustainability in nature-based tourism can be enhanced.

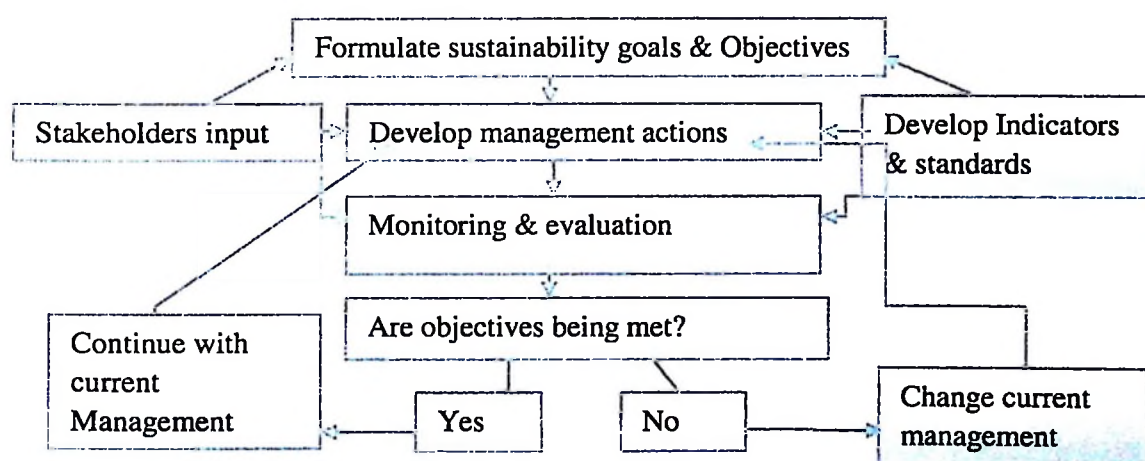


Figure 3-1: Framework for managing negative impacts for wildlife tourism adopted from Higginbottom (2004).

In general the sustainability framework presented by Higginbottom (2004) is very useful for this thesis as it forms a theoretical basis upon which sustainable wildlife

tourism development rests. However, the framework is not designed specifically for climate change. Thus, the elements presented in Higginbottom's (2004) framework will only be used as references to the review of existing climate change adaptation frameworks. The major reason for this application is to ensure that the climate change adaptation framework to be proposed in this thesis is in line with existing sustainable wildlife tourism framework. However, issue of what approach to adopt in implementing sustainability framework is of great importance as it determines the extent to which sustainability goals can be achieved (Higginbottom et al., 2003). As said in section 2.4.5, holistic (systems) approach is the core approach emphasised by wildlife tourism researchers for its effectiveness in addressing sustainability issues (Becken, 2007, 2010; Buckley, 2012; Spenceley, 2010; Spenceley & Meyer, 2012).

However, due to varying goals and interests among tourism stakeholders, the use of holistic approach in sustainable tourism development have faced challenges related to who or what to sustain in the system. Prevailing literature explains that the issue of 'who' or 'what' to sustain in wildlife tourism has relied on individual perceptions or those of the organisation that implements sustainability framework (Buckley, 2012). Buckley (2012) asserts that despite many tourism practitioners being aware of holistic approaches, currently a few of them critically apply the holistic approaches. Most of practitioners tend to sustain only features of their interest – that is features that contribute directly to their net profits or improve their relations with other stakeholders. This tendency has seen many holistic frameworks focusing on only one or two aspects of a system, either environmental and/or economic sustainability (Cooper & Vargas, 2004).

Despite the recognition that negative impacts exist in economic, social and environmental arenas of a coupled human-environmental system (Mathieson & Wall, 1982), in most cases existing sustainability frameworks have tended to omit the social dimensions of sustainability (Becken, 2010; Farrell & Twining-Ward, 2005; Twining-Ward & Butler, 2002). Farrell & Twining-Ward (2005) interpreted this apparent lack of attention to social aspects of sustainable wildlife tourism development as an impediment, to move sustainability from principles to policy making. In a system, such as wildlife tourism system, where there is a strong interconnectedness among various system components, addressing only one aspect of the industry may leave the whole

system vulnerable to or under-prepared for negative impacts. Thus for a successful implementation of a sustainability framework, the holistic approach requires that the sustainability framework is designed and implemented in such a manner that all social, environmental and economic aspects of a studied system are considered (Burns & Howard, 2003; Wu, 2009), as mapped in Figure 3-2.

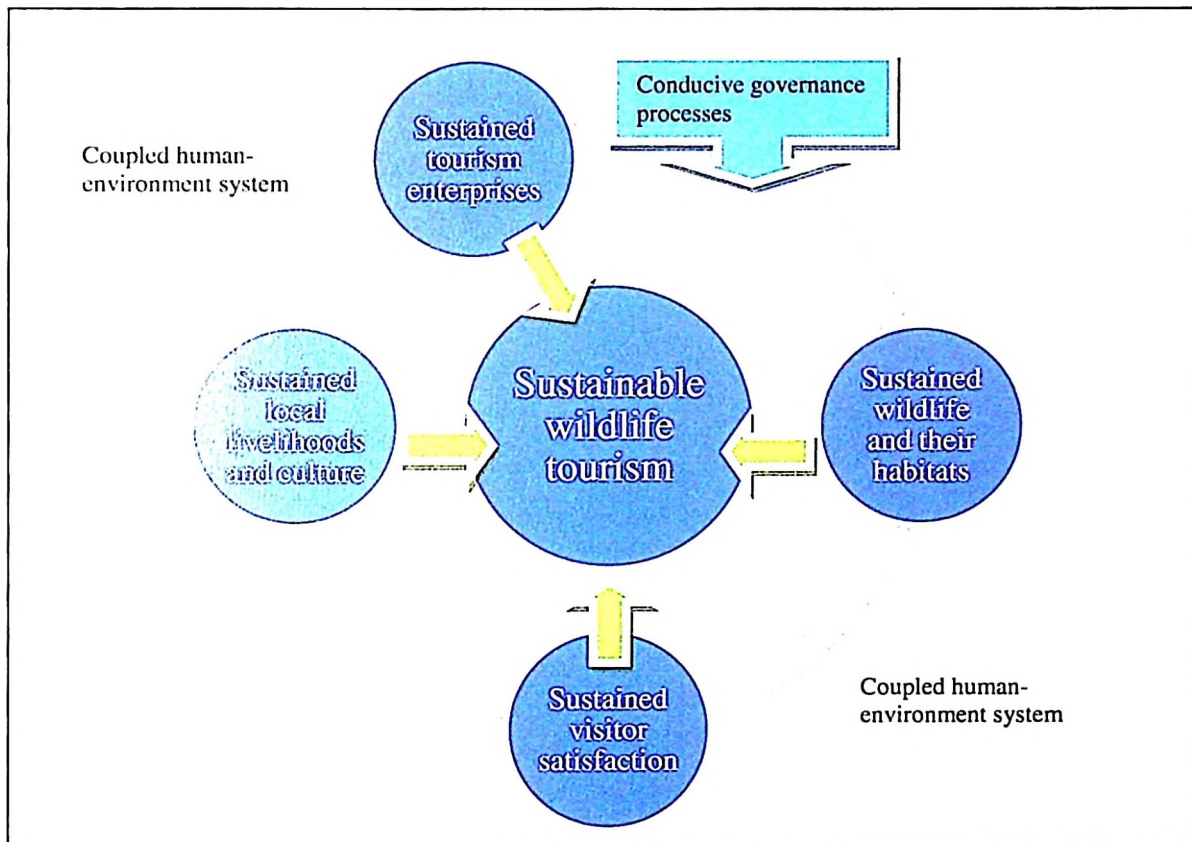


Figure 3-2: Requirements for sustainable wildlife tourism

In summary, this section has presented a review of the existing literature upon which sustainable wildlife tourism development has been undertaken. The review uncovered important issues that are relevant for adaptation to climate change. The most pressing issue is the need to reduce negative impacts facing wildlife tourism in a holistic manner. The literature requires that this reduction should aim to protecting social, economic and environmental aspects of wildlife tourism simultaneously for current and future generations. However, the literature indicated that the existing attempts to achieve sustainability lack the holistic nature, as they exclude some of the key issues for sustainability. For instance, most of the sustainability frameworks tend to sustain environmental and/or economic aspects of tourism at the expense of social aspects. As such, the potential of applying a holistic approach to sustainable wildlife tourism has

not been fully realised. Given this issue, some researchers are concerned that wildlife tourism is currently far from sustainability (Cooper & Vargas, 2004; Farrell & Twining-Ward, 2005). This short- and long-term dilemma suggests the need to strengthen the existing sustainability framework by developing new ones.

As this thesis aims at developing a theoretical climate change adaptation framework, the following issues seem to be particularly relevant when designing and strengthening the existing sustainability framework: the need to identify and review the current climate change adaptation frameworks; and the need to develop a theoretical framework that addresses critically the issues for sustainable wildlife tourism development. It is important to consider holism as one of key aspects for reviewing and developing climate change adaptation frameworks.

3.3 Climate change adaptation frameworks

Climate change is recognised by many researchers as one of the potential sources of negative impacts on tourism. However, for many years it has received little attention in sustainable tourism development studies. As seen in Table 3-1, climate change is missing in the list of negative impacts that have been known to affect wildlife tourism. As a result, only a few authors in recent years have attempted to address climate change impacts on tourism (Becken, 2007, 2010; Buckley, 2012; Dudley et al., 2010; Gössling et al., 2009; Hambira et al., 2013; Ngaruiya, 2009). This shortfall is also recognised by Scott (2011) who acknowledges that tourism, in general, is only in its early stages of development in advancing knowledge to manage the impacts of climate change. Wildlife tourism is still emerging and has some way to go before it will advance such knowledge (Lambert et al., 2010). As a result, wildlife tourism has remained under-prepared for climate change impacts and the matter is becoming increasingly urgent in research discourses.

Given climate change is now considered a threat to the sustainability of wildlife tourism, and that sustainability is a context specific phenomenon, the next task for researchers is to design effective adaptation strategies for this sector. As discussed in section 3.2, a holistic approach is vital to ensuring climate change adaptation in wildlife tourism is consistent with the general tenets of sustainable tourism development by

determining specific frameworks. In other words, specific frameworks should be developed to guide the enhancement of sustainable wildlife tourism development in the context of climate change.

In recognition of this need, various authors have developed holistic frameworks for tourism adaptation to climate change (Becken & Hay, 2007; Calgaro, 2011; Hall & Higham, 2005; Homewood, Kristjanson, & Trench, 2009; Jiang et al., 2012; Jopp, 2012; Jopp et al., 2010; Leiper, 2004; Scott et al., 2009). A review of these frameworks is important to identify how applicable are these frameworks to wildlife tourism. The following section therefore provides a review of various frameworks developed for climate change adaptation in tourism more generally.

3.3.1 Hall and Higham's model

The framework developed by Hall and Higham (2005) shows the relationship between climate change and the tourism system from a holistic perspective. Hall and Higham's framework (see Figure 3-3) shows how climate change can impact major regions of a tourism system, including: tourist generating regions; tourist destination regions; and transit regions. Although the framework does not provide information on how tourism will adapt to climate change across the various regions, it highlights the potential negative impacts of climate change on each tourism region. Identification of potential negative impacts of climate change on tourism provides a starting point for developing adaptation strategies. Nevertheless, adaptation is a context specific phenomenon and therefore the framework, as it is presented, cannot apply directly to wildlife tourism until thorough analysis has been undertaken.

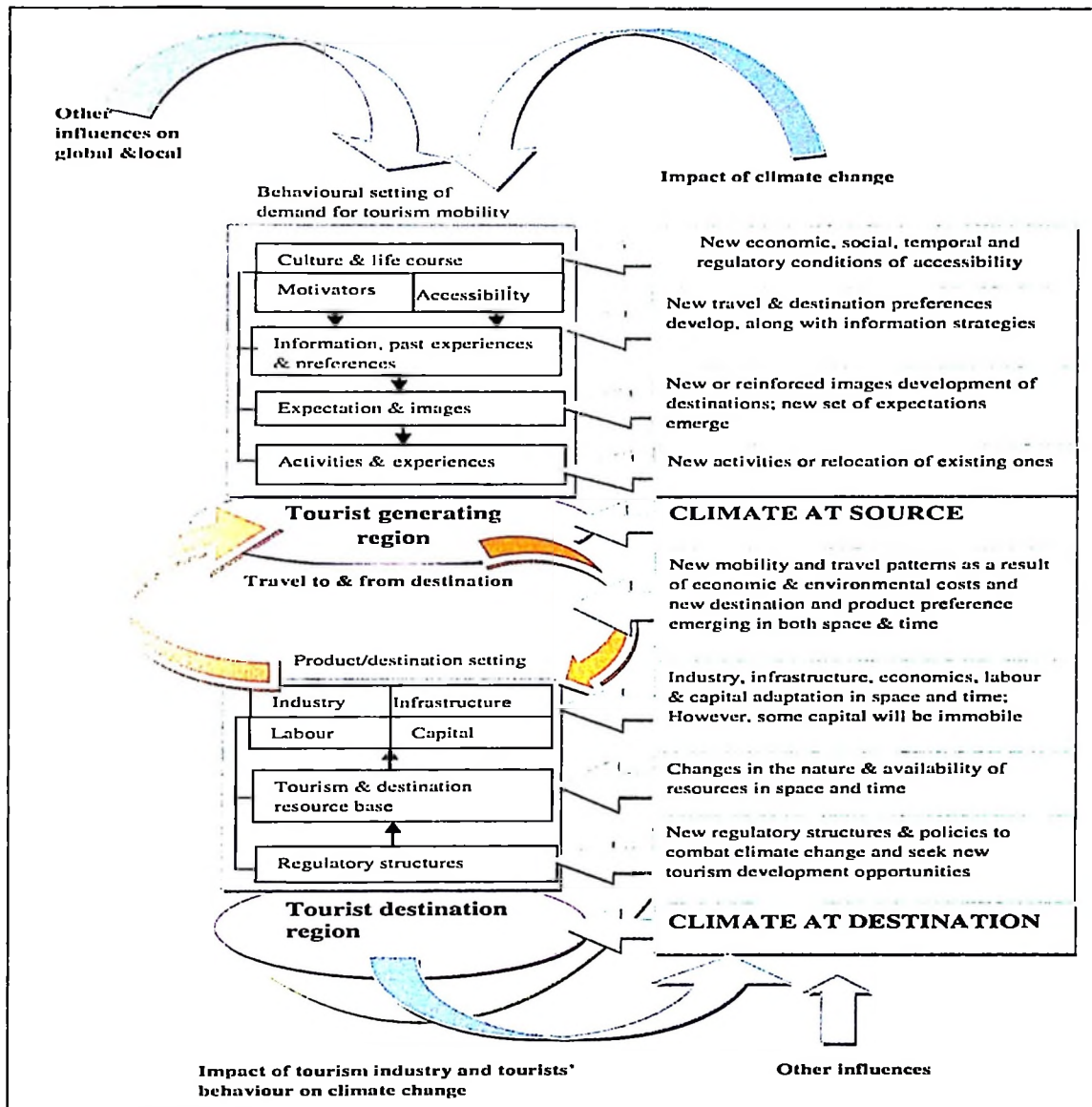


Figure 3-3: Tourism system and climate change relationship model (Hall & Higham, 2005, p. 14).

3.3.2 Simpson/Scott/Becken and Hay's frameworks

The frameworks developed by Simpson et al. (2008), Scott et al. (2009) and Becken and Hay (2007) provide useful knowledge on climate change adaptation for different tourism subsectors. Criticism that can be raised for these frameworks is they do not provide clear information about how to undertake vulnerability assessment in wildlife tourism. Vulnerability assessment is an important step prior to developing adaptation strategies (Calgaro et al., 2013; Jopp, 2012; Jopp et al., 2010; Scott et al., 2009;

Simpson et al., 2008). Undertaking vulnerability assessment prior to developing adaptation strategies is in line with sustainable wildlife tourism development, as it helps to develop an understanding of the context and extent of vulnerability so appropriate adaptation strategies can be directed (Smit & Pilifosova, 2003). Moreover, vulnerability assessment prior to developing adaptation strategies help to identify key vulnerability issues for policy formulation. It also helps to identify and clarify the diversity of stakeholders involved before developing adaptation. Due to a lack of vulnerability assessment, these frameworks are considered limited in addressing adaptation to climate change in wildlife tourism. However, deficiencies in these models have stimulated interest among other researchers, including Calgaro et al. (2013a, 2013b) and Jopp et al. (2010), to develop more effective vulnerability assessment and adaptation models.

3.3.3 Regional Tourism Adaptation Framework (RTAF)

The RTAF framework put forward by Jopp (2010) is among the most comprehensive models for undertaking adaptation (see Figure 3-4). This framework considers undertaking vulnerability assessment as a first step in developing adaptation strategies. Vulnerability assessment helps to identify those who are vulnerable to climate change. The key strength of Jopp and colleagues' framework lies in its systematic display of sequential phases necessary for vulnerability assessment and adaptation to climate change. These include: phase 1, *vulnerability and resilience assessment* (which includes the definition of the tourism system, establishment of risks and opportunities and determination of destination's adaptive capacity); and phase 2, *adaptation process* which aims to *increase resilience* of a destination to climate change as well as its *readiness* to take up opportunities brought about by climate change. Another important point for this is its inclusion of evaluation of adaptation options based on developed indicators.

In general, Jopp and colleagues' framework provides useful elements in line with existing sustainable wildlife tourism. For example, elements such as system definition and establishment of risks and opportunities; engage stakeholders, identify adaptation options (i.e. identify the best sustainability approaches); assess options (i.e. evaluate the options to fit the studied context); and implementation are similar to the elements presented in figure 3-1. Importantly, the framework put forward by Jopp et al. (2010)

provides information about where to start the process of vulnerability assessment and adaptation. This helps to clarify the goals and objectives of adaptation from the beginning.

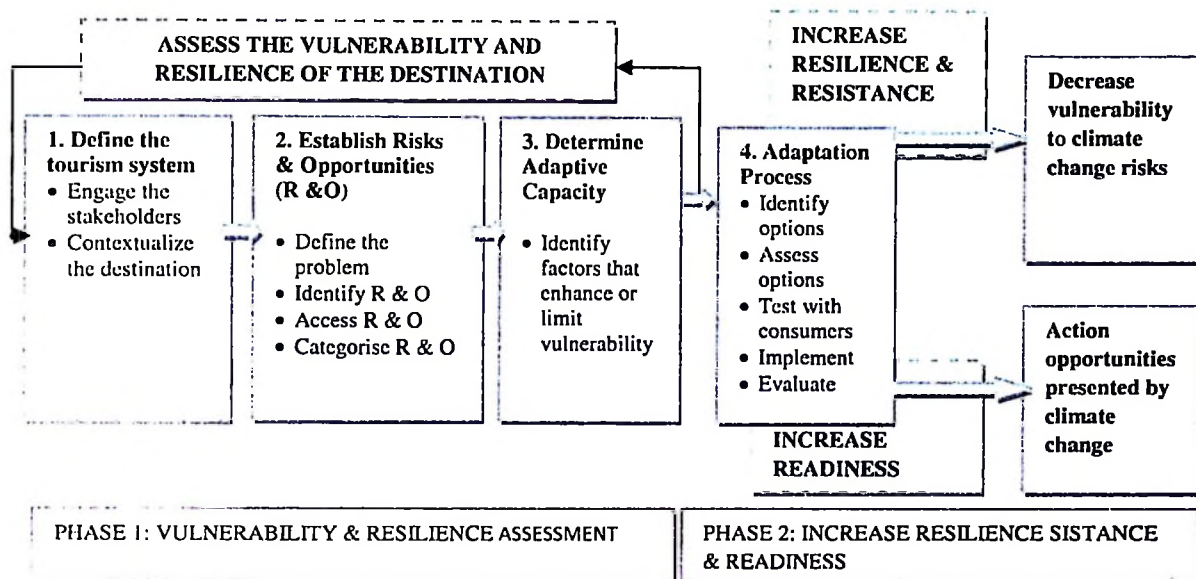


Figure 3-4: Regional Tourism Adaptation Framework adapted from Jopp et al. (2010).

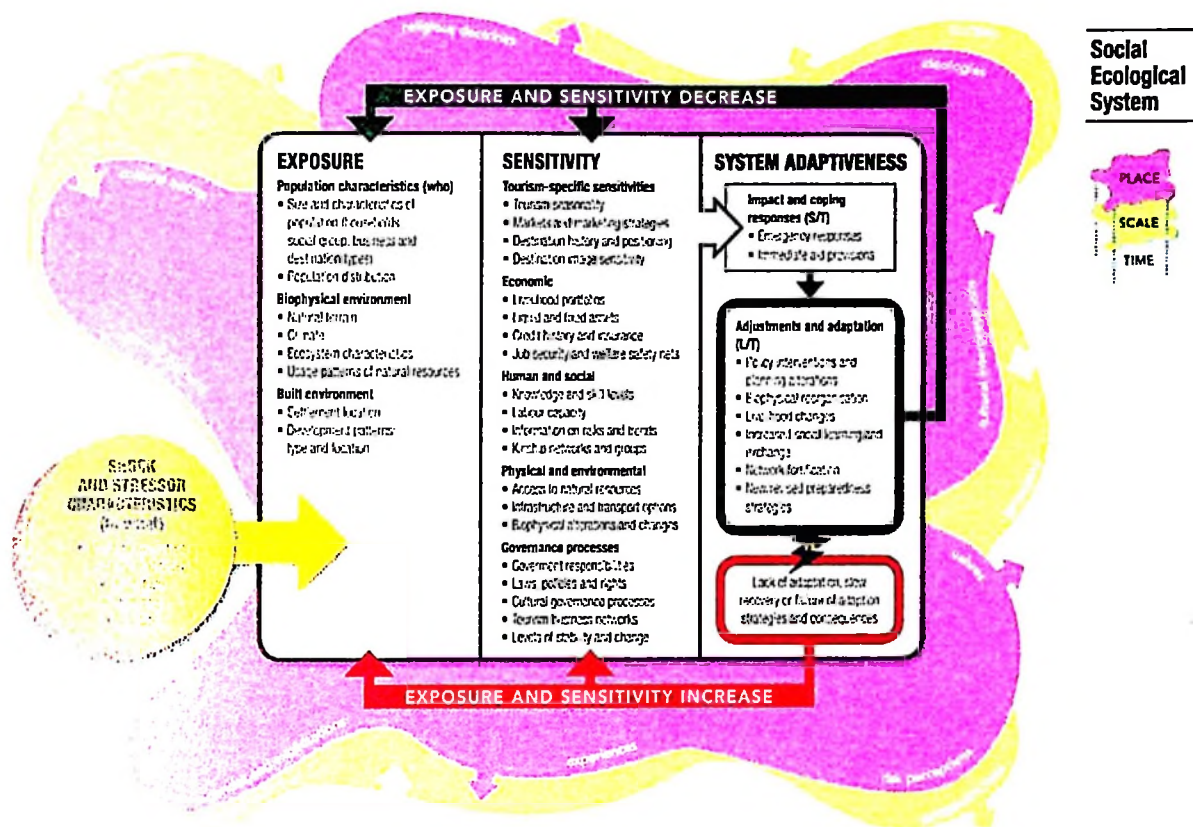
However, this study raises criticisms on Jopp and colleagues' framework as follows: (1) it does not specify the possible sources/drivers of vulnerability (as such it fails to explain how different factors and processes can combine to influence the vulnerability of a destination); (2) it is dominated by social aspects of the studied system and, as such, its capacity to address vulnerability and adaptation in systems involving complex interactions of human and environment is questionable; and (3) it does not ascertain clearly the position of policies in vulnerability assessment and adaptation to climate change. Given these deficiencies, Jopp and colleagues' model cannot be tested without inputs from other frameworks. Therefore, to design a more robust framework that is best suited for wildlife tourism, Jopp and colleagues' framework was combined with some inputs from the Destination Sustainability Framework (DSF) developed by Calgaro et al. (2010), which is presented in figure 3-5.

3.3.4 Destination Sustainability Framework

The DSF framework developed by Calgaro (2010) is perhaps the most comprehensive model of vulnerability assessment and adaptation to climate change specifically for tourism destinations. It captures the holistic nature of a coupled human-environmental

system as emphasised in sustainability literature. Key strengths of this framework include the element of vulnerability assessment as a useful action prior to developing adaptation strategies and its multidisciplinary nature, formed by integrating knowledge of sustainability from different fields and theories including: *Chaos-complexity theory* (Gössling et al., 2008; O'Brien et al., 2004); *Vulnerability-based theory* (Babbie, 2012; Moreno & Becken, 2009; O'Brien et al., 2007); *The Bogardi Birkmann Cardona Framework (BBC) framework* (Ezzy & Liamputtong, 2005); *Adaptive Cycle Metaphor and Panarchy model* (Holling & Gunderson, 2002; Preucel & Mrozowski, 2010); *Sustainable Development - Sustainable Livelihoods Framework* (Baker & Coulter, 2007; DFID, 1999); *Resilience theories* (Coyne, 1997; Preucel & Mrozowski, 2010); *Pressure and Release/Access to Resource model* (Wisner, 2004); *Sustainability Science Framework and Climate Change theory*. Figure 3-5 presents Calgaro's Destination Sustainability Framework (DSF).

Furthermore, Calgaro's framework is considered strong because it includes both climatic and non-climatic impacts as the potential source of destination vulnerability. This framework also allows for the application of new terminologies (e.g. shocks and stressors, exposure, sensitivity and adaptive capacity) to the study of sustainable tourism development. These terminologies have rarely (if ever) been used in existing sustainable tourism development frameworks. Given these strengths, the framework proposed by Calgaro (2010) provides an important input for developing a conceptual climate change adaptation framework for wildlife tourism.



Source: Calgaro (2010).

Figure 3-5: Destination Sustainability Framework (DSF).

However, Calgaro's model appears to be dominated by the social component of the tourism system. The ecological component which includes wildlife and their ecosystems is less addressed in Calgaro's framework. As such, it has inherited the common problems that most holistic sustainability frameworks have been facing. As presented in section 3.2, sustainable wildlife tourism development frameworks require balanced protection of social, economic and ecology/environmental aspects of a the wildlife tourism system. In addition, Calgaro's model is neither designed nor tested in wildlife tourism. Similarly, the model does not provide adequate practical information on how, by whom and under what conditions vulnerability assessment and adaptation can be implemented in other tourism sectors like wildlife tourism. For these reasons, I consider that Calgaro and colleagues' model need some inputs from other frameworks, particularly the ecological adaptation frameworks, for it to be applied in wildlife tourism.

In summary, each of the frameworks reviewed above contains key strengths and limitations from wildlife tourism perspectives. They provide useful approaches to tourism adaptation to climate change in general. However, wildlife tourism needs a specific framework to guide its adaptation due its complexity. Therefore, key strengths of the above frameworks are combined to develop a more robust theoretical framework for wildlife tourism. In other words, this marks the beginning of the development of a suitable framework to guide the vulnerability assessment and adaptation process in wildlife tourism. Based on the knowledge gained from sustainable wildlife tourism and from the reviewed frameworks, the following section provides key issues for the development of a new framework. Figure 3-6 presents the developed theoretical framework.

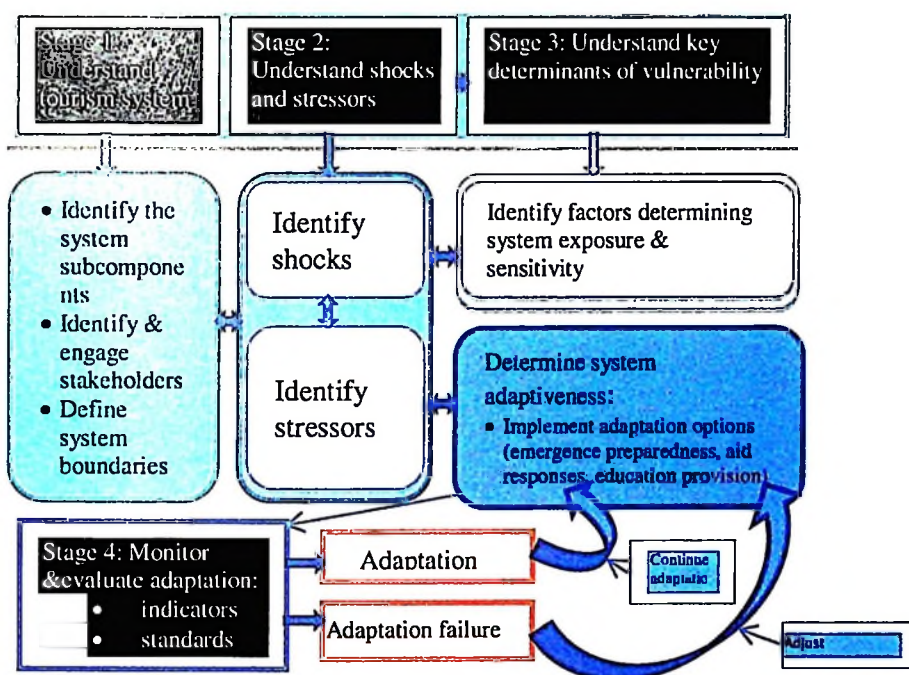


Figure 3-6: Wildlife Tourism Vulnerability Adaptation Framework (WTVAF)

3.4 Wildlife Tourism Vulnerability Assessment Framework

The wildlife tourism Vulnerability Assessment Framework (WTVAF) is intended to guide the assessment of vulnerability in the NCA. The framework is developed from key issues identified from the reviewed frameworks above. These are systematically presented below.

Stage 1: Understanding the wildlife tourism system

The framework developed by Hall and Higham (2005) shows the relationship between tourism system and climate change. In this model, all the components that make up a tourism system may be impacted by climate change. And according to this model there are various impacts highlighted as being the major cause of vulnerability to system components. But according to the literature, vulnerability is a contextual issue and depends on the adaptive capacity of the system considered. Therefore, the likelihood of identified impacts causing vulnerability in Hall and Higham's model will depend on the context/circumstantial characteristics of the system under investigation. Thus it is imperative to develop an understanding of the context of the system, considered as a first stage of developing adaptation strategies, for a particular destination. This will help to identify the needs of different stakeholders involved in the framework.

In Jopp and colleagues' model, defining the tourism appeared as an initial stage of vulnerability assessment. Similarly, for the development of a wildlife tourism vulnerability adaptation framework (WTVAF), stage 1 should be 'understand the wildlife tourism system'. The identification and engagement of key stakeholders (i.e. all stakeholders affected positively or negatively by wildlife tourism) should be included in this stage. Identification and engagement of stakeholders is in line with the existing sustainable wildlife tourism literature.

Stage 2: Understanding shocks and stressors

The factors that trigger vulnerability of the tourism system to climate change impacts appeared in all models reviewed above. The major requirement is to identify those issues after the studied context has been defined. In Hall and Higham's model (Figure 3-2), the issues were collectively termed 'climate change impacts'. In Jopp and colleagues' framework (Figure 3-4) these issues were referred to as 'risks and opportunities'. In Calgaro's framework (Figure 3-5) the impact issues were presented as 'shock and stressor characteristics'. Identification of impacts/risks/shocks and stressors is in line with sustainable wildlife tourism framework (refer Figure 3-1). This study adopted Calgaro's concept of shocks and stressors.

Stage 3: Assessing exposure, sensitivity and adaptive capacity

Vulnerability is the function of a system's *exposure*, *sensitivity* and *adaptive capacity* to the impacts of climate change (IPCC, 2007a). As shown in Figure 3-5, these concepts clearly appeared in Calgaro's framework and, according to this framework, they are considered as major determinants of vulnerability. The key question is what factors determine the system's exposure sensitivity and adaptive capacity to shocks and stressors? Calgaro et al (2013b) highlighted that exposure, sensitivity and/or adaptive capacity is not impacts; rather, they are factors and/or processes that can heighten or slow the impacts (shocks and stressors) and their consequences. These factors are controlled by the processes operating in the context of the system considered (Calgaro et al., 2013b). Therefore, the major task for this study is to identify those factors and processes.

This study adopted these concepts and used them to develop a new climate change adaptation model for wildlife tourism. According to Calgaro (2011) the major processes that may influence the system's exposure to vulnerability include: changes in human population (i.e. size and distribution); changes in the biophysical environment (e.g. natural terrain, climate, ecosystem characteristics, usage patterns of natural resources); and development patterns (e.g. building types, position and orientation). The model also includes factors that determine destination's sensitivity: tourism specific sensitivities (seasonality, market and marketing strategies, and destination history and positioning); economic sensitivities; human and social sensitivities; physical and environmental sensitivities (e.g. access to natural resources, infrastructure and transport options); and government processes (Fussel, 2007; Smit & Wandel, 2006).

Finally, according to Calgaro and colleagues' model (see Figure 3-5), improving the system's adaptive capacity is important in reducing vulnerability and it involves the implementation of adaptation strategies such as providing information for increasing preparedness, providing emergence recovery aids and improving the provision of social services (Smit & Pilifosova, 2003). . All these are provisions are important elements for sustainable wildlife tourism. However, it is important to note that in Calgaro and colleagues' model what are shown as sensitivity factors are shown by other authors (e.g. Daze et al., 2009) as factors for improving the system's adaptive capacity.

Stage 4: Monitoring and evaluation

As shown in section 3.2, monitoring and evaluation are highlighted as important aspects to consider in enhancing sustainable wildlife tourism. Although the issue of monitoring and evaluation did not feature clearly in Calgaro and colleagues' model, it is implicitly explained as feedback loop. Consideration of monitoring and evaluation is important in determining the success or failure of adaptation. According to Calgaro et al. (2014), the examination of the subsequent outcomes of adaptation, failed adaptation or no adaptation provides feed back into the system, thereby shaping the system's exposure and sensitivity to future events. In Jopp and colleagues 'model the issue of evaluation appeared very clear in the "adaptation process" stage. The monitoring and evaluation process in highlighted in Jopp and colleagues' model involves identifying, assessing, testing adaptation options, before implementation. However, as previously mentioned, Jopp et al. (2011) did not put forward criteria for assessing and testing (i.e evaluation) adaptation options. Therefore, this is an important issue to consider when proposing a suitable framework for wildlife tourism adaptation to climate change.

3.5 Chapter summary

As there has been no climate change adaptation framework available in the literature for African wildlife tourism, the ultimate purpose of this chapter was to investigate existing frameworks and their application to wildlife tourism, with the aim of identifying the need to develop a theoretical framework specifically applicable to climate change adaptation in wildlife tourism. This purpose was accomplished by: firstly, reviewing the sustainable wildlife tourism literature to establish a theoretical base for sustainable wildlife tourism; and secondly, reviewing existing theoretical climate change adaptation frameworks. The reason for this review was to establish a link between climate change adaptation frameworks and sustainability theories. Given that achieving sustainable development is the main goal of wildlife tourism, establishing this link helped to understand whether prevailing climate change adaptation frameworks are developed from sustainability theories.

The review established that most climate change adaptation frameworks contained important elements of sustainability, as shown in figure 3-6. In addition, the review identified that terminologies such as shocks and stressors, exposure, sensitivity and

adaptive capacity have been rarely/or not used in sustainability, and therefore can be adopted in sustainability studies. However, insufficient holism application was a major drawback observed in most of the current climate change adaptation frameworks. This is a major gap for the existing climate change adaptation frameworks. As such, there is no single framework, among those reviewed, that can be applied directly to wildlife tourism and this suggest for developing a theoretical framework suitable for wildlife tourism. The review of the frameworks in this chapter is summerised into a single diagram as shown in figure 3-6. This is not, however, to say that the framework (figure 3-6) developed from this chapter is the exemplar. The remaining task, therefore, is to test this framework in the case study. Thus the following chapter presents the methodology for testing this framework in NCA, Tanzania.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

This chapter presents the discussion of methodological approach used to accomplish this thesis. The discussion of methodological approach is one preliminary consideration before undertaking any research (Creswell, 2003). Creswell, (2003) highlighted that the discussion of research methodology should consider: the discussion of paradigms (i.e. philosophical assumptions about what constitute knowledge), the research design (the also called the strategy of inquiry) and the methods (i.e. general procedures of data collection, analysis and thesis writing). The discussion of these elements is extremely important in research because it helps the researcher to justify why a particular approach, method or procedure was (or not) adopted (Gray, 2004; Jennings, 2010; Neuman, 2011). This chapter is, therefore, organised as follows: section 4.2 presents an overview of the paradigms underlying research; section 4.3 discusses the research design for this thesis (including the justification for choosing qualitative research to achieve the objectives of this thesis); and section 4.4 presents the discussion of methods used to accomplish data collection and analysis.

4.2 The research paradigms

The discussion of paradigms is an important element to consider when presenting a research methodology (Gray, 2004; Jennings, 2010; Neuman, 2011; Pearce et al., 2011; Tashakkori & Teddlie, 1998). The discussion of paradigms helps to establish the reality from which the executions of research questions and discussion of results can be based (Hennink et al 2011). Paradigms are ‘perspectives or ways of looking at reality, and they are the frames of reference we use to organise our observations and reasoning’ (Hennink et al., 2011, p.11). Paradigms are philosophical assumptions, concepts, and propositions about the nature of reality which provide a basis for designing and executing the research (Bogdan & Biklen, 1982; Bryman, 2001; Creswell, 2003; Jennings, 2010). In other words, a paradigm is a theoretical framework/model for research (Neuman, 2011), and it is defined as a ‘net that contains the epistemological, ontological and methodological premises of a research’ (Hennink et al., 2011, p.11).

The epistemology and ontology are different but closely related concepts frequently used to guide the choice of the research design and methods (Pearce et al., 2011). The concept of epistemology refers to 'the philosophy or knowledge of how we come to know the reality' and ontology 'is the philosophy of reality' (Krauss, 2005 p. 758). The epistemology helps the researcher to make decision on what types of knowledge are legitimate and what data is adequate (Gray, 2004). There are two contrasting theoretical views underlying epistemological and ontological research: interpretivism (also known as constructionism) which 'assumes that reality is the product of social processes; and objectivism which purports that there is an independent reality (Babbie, 2012; Hennink et al., 2011; Neuman & Kreuger, 2003).

On the other hand, the research methodology is a strategy concerned with the identification of particular practices to attain knowledge (Krauss, 2005). Similarly, methodology can be explained simply as a 'research strategy that translates epistemological and ontological principles into guidelines that show how research is to be conducted' (Sarantakos, cited in Tuli, 2011 p. 102). There are a variety of research methodologies but a researcher would choose the methodology that enables him/her to describe, explore and understand in greater detail the phenomena of inquiry (Ritchie, Lewis, Nicholls, & Ormston, 2013). Generally, the research methodology is expected to contain principles, procedures, and practices that govern the research execution (Marczyk, DeMatteo and Festinger, cited in Tuli, 2011). Ethical consideration is also an important element of a research methodology (Creswell, 2003).

In order to explore, describe and understand the social phenomena, researchers within social science orient themselves as either interpretivists or objectivists (Tuli, 2011). While interpretivists believe that the purpose of inquiry is to understand a particular phenomenon rather than generalising the findings to a population (Farzanfar, 2005), the opposite is true for positivists (Bryman, 2001). The orientation of a researcher as either interpretivist or positivist determines the research strategy/design to be adopted to describe, explore and understand the social phenomena (Tuli, 2011). The following section (section 4.3) presents the two dominant methodological approaches that govern the positivists and objectivists' choice of a research design/strategy.

4.3 Methodological approaches

The orientation of researchers as either interpretivist (also known as constructionist) or positivist has led to the evolution of two dominant methodological approaches: qualitative and quantitative research (Bryman, 2001; Tuli, 2011; Griffin & Phoenix, 1994). Positivist researchers are generally, linked to quantitative methodology (Esterberg, 2002; Neuman, 2011), whereas interpretivists are aligned with qualitative methods (Jennings, 2010). Both approaches are considered appropriate for understanding phenomena, and therefore can supplement or complement each other (Griffin & Phoenix, 1994). However, as explained previously, a researcher would choose a particular methodological approach depending on how best will reach the research objectives.

Studies about research designs present two major conditions that a chosen methodological approach must fulfill: validity and reliability (Yin, 2009). The implication for these conditions is that the chosen approach must enable a researcher to appropriately and adequately answer the research questions and yield rigorous findings (Baxter & Jack, 2008). In quantitative research, rigorous findings are those obtained from randomly selected samples and statistical analysis, and can be generalised to different populations. On the other hand, the purpose of qualitative research is to generate rigorous results that can be generalised to theory rather than to populations (Bryman, 2001). However, depending on the nature of the research each of these methodological approaches has its own strengths and limitations that can lead to its adoption or redundancy by a researcher (Bryman, 2001). These limitations can limit the achievement of rigorous findings. The strengths and weaknesses of quantitative and qualitative methodological approaches are highlighted in the next section.

4.3.1 Quantitative research

Quantitative research has been a dominant methodological approach within positivist in social science (& Phoenix, 1994) in the 20th century (Tuli, 2011). Quantitative research has its origin in Biology, Chemistry, Physics, Geology and others (Tuli, 2011). As said previously the adoption of quantitative or qualitative method is based on its strengths to answer the research questions (Eisenhardt, 1989). Depending on what type of data needed, a researcher can choose quantitative research methodology if the intent is to:

obtain a broad analysis of phenomena (Griffin & Phoenix, 1994); test hypothesis and validate theories about the ways phenomena occur; generalize research findings to different populations; obtain data that allow for prediction of phenomena; involve a large number of people; and establish cause and effect relationships. Furthermore, a researcher can decide to use quantitative research methodology if: the time frame allocated for data collection and analysis is too short; the researcher want precise numerical data (i.e. the data subjected to statistical verification) and if the researcher want his/her findings to be repeated by other researchers. It is also important to note that in quantitative research the research results are relatively independent of the researcher (minimise bias) (Eisenhardt, 1989; Creswell, 2003).

Quantitative research methodology has also inherent limitations which may lead to its denial by a researcher. The following are the key limitations of quantitative research methodology: quantitative research involves things which can only be observed and measured (i.e. any aspect that cannot be subjected to direct observation or measured is considered as beyond the scope of quantitative research) (Griffin & Phoenix, 1994); very often quantitative research does not uncover the meaning people attach to social phenomena; quantitative research is based on objectivist or realist ontology; in quantitative research, the theory used may not necessarily reflect the real local situation (Creswell, 2003); knowledge produced from quantitative methodology might be too abstract and general for direct application to specific local situations, contexts or individuals (Thomas, 2003; Griffin & Phoenix, 1994). Quantitative research is also considered as reductionistic in that the intent is to reduce the ideas into a small, discrete set of ideas to be tested, such as the variables that constitute hypotheses and research questions' (Creswell, 2003 p. 7). Given these limitations, some researchers in social sciences expressed dissatisfaction with quantitative methodology as a core methodology for research and knowledge generation (Tuli, 2011). These researchers are of the views that 'the research should focus on understanding the meaning that events have for individual being studied' (Tuli, 2011 p. 98). This requires a close collaboration between a researcher and the participants while enabling participants to tell their actions and experiences about a researched phenomenon. Based on this argument, qualitative research emerged as another core research methodology in social science (Creswell, 2003).

4.3.2 Qualitative research

The purpose of the emergence of qualitative research is not to replace quantitative methodological research, rather to provide an alternative way of understanding phenomena (Ritchie et al., 2013). The purpose is to enable the researcher to better understand the participants' actions, experiences and criteria for decision making (Lather, 1992; Robottom & Hart, 1993). 'A qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e., the multiple meanings of individual experiences, meanings that are socially and historically constructed with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e., political, issue-oriented, collaborative or change oriented) or both' (Creswell, 2003 p. 18). However, depending on the research questions, qualitative research methodology has some inherent strengths and weaknesses/limitations that can favour or limit researchers to choose it as a useful strategy for exploring, understanding and describing phenomena (Griffin & Phoenix, 1994).

The strengths of qualitative research are attached to the purpose of qualitative research which is to enable a researcher to better understand participants' actions, inactions, experiences and criteria for decision making (Lather, 1992; Robottom & Hart, 1993), particularly participants' behaviours, beliefs and processes that control their relations with each other and their environment (Hennink, Hutter, & Bailey, 2011). In this respect, qualitative research seek to ask and answer the questions related to: 'who' or 'what', as well as 'why' and 'how' (Hennink et al., 2011). The strengths of qualitative research, as highlighted by Griffin & Phoenix (1994) also include: 'a researcher focusing on operation of social processes in greater depth; provides an understanding of meanings people give to phenomena occurring at their local context, particularly how people experience events from their won perspective and how they perceive the world; can help a researcher to clear the inconsistencies and contradictions arising from within and between studied individuals; offers researchers a degree of flexibility and facilitates the examination of sensitive or difficult topics; and enables researchers to make connections between different aspects of people's lives such as the domestic sphere, employment and leisure time' (p. 6-7).

On the other hand, the limitations of qualitative research are highlighted by Griffin and Phoenix (1994), Creswell (2003) and Ritchie et al. (2013) as follows: requires careful selection of appropriate data collection method, given the need to involve a wide range of techniques and epistemological assumptions; the knowledge produced using qualitative research methodology might not be generalised to other people or other settings (i.e., findings might be unique to the relatively few people included in the research study); making prediction with qualitative research is difficult; testing hypothesis using qualitative methodological approach is difficult; compared with quantitative research, qualitative methodological approach is time consuming particularly with data collection and analysis; it is based on subjectivist ontology (i.e. the results can be influenced by the researcher's personal biases and idiosyncrasies).

4.3.2 Qualitative as an appropriate methodological approach for this thesis

This thesis is founded from qualitative research based on interpretivism perspectives. Phillimore & Goodson, (2004) suggest that it is essential for tourism researchers adopting qualitative methodological approach 'to justify their choice of this approach and make visible their data collection and analysis procedures. This is essential to enable the audience to judge the quality of the research, the approach taken and the rigor inherent in the research process' (p. 38). Most of the researchers know that the choice of a methodological approach is not predetermined, rather the approach is chosen based on its appropriateness in answering the research questions (Silverman, 2013). Given the nature of the research questions, the choice of either qualitative or quantitative methodological approach may depend on number of factors including: 'researcher's belief about the nature of reality (ontology); the nature of knowledge and how it can be acquired (epistemology); the characteristics of research participants; the audience for the research; the funders; and the position and the environment of the researchers themselves' (Ritchie et al., 2013 p. 2). Given these arguments, my choice to engage in qualitative research as an appropriate methodological approach for this thesis was a product of both personal belief and a sense that the research questions addressed in this thesis could be best tackled through qualitative research. However, to justify how I arrived at this choice, it is important to: firstly, recap on the nature of this study, and secondly, link the research with some of the identified strengths and weaknesses of both quantitative and qualitative methodological approaches.

The aim of this research is two folds: firstly, to review existing frameworks for climate change adaptation and their applicability to wildlife tourism, and secondly, to develop, if necessary, a new theoretical framework to assist wildlife tourism to understand vulnerability and adaptation to climate change. As the aim highlights, the key issue of inquiry, for the development of the framework, is to understand vulnerability and adaptation to climate change in a complex wildlife tourism destination. As explained in chapter 2, sections 2.4.2 and 2.4.3, vulnerability and adaptation are context- and place-specific as well as complex and dynamic phenomena that can take place at local, national or international scales. Most of the research questions (see Appendix B-1a and B-1b) for this thesis have been revolving around vulnerability and adaptation at local scale. Having this background in mind, I capitalise on strengths of qualitative and disqualify quantitative research as elaborated in the following paragraphs.

The purpose of qualitative research (based on interpretivist view) is to facilitate an understanding of phenomena such as people's behaviours, beliefs, practices and experiences, and factors and processes that control their daily lives (Hennink, Hutter, & Bailey, 2011). To facilitate this understanding, an interpretivist asks questions related to 'why' and 'how' people choose certain actions and not the other (Hennink et al., 2011). I considered these questions as relevant for understanding vulnerability and adaptation to climate change in the studied area.

Adaptation to climate change is all about peoples adjusting their behaviours, practices and processes that controls their daily lives, in order to reduce vulnerability to climate change (IPCC, 2007; Smit & Pilifosova, 2003). Given this, I consider the questions posed by interpretivists to understand phenomena as relevant for understanding vulnerability and adaptation to climate change. On the contrary, quantitative researchers (positivist) seek to understand phenomena without asking why people behave in that way (Guba & Lincoln, 1994; Phillimore & Goodson, 2004) and for this reason I consider quantitative research methodology as not appropriate for understanding vulnerability and adaptations taking place in the studied area. Similarly, understanding vulnerability and adaptation requires full interaction between a researchers and the research, i.e. participatory research (IPCC, 2007). In this way an inquirer understands vulnerability and adaptation from people's experience (Smit and Pilifosova, 2003). As

said in section 4.3.1, one of the weaknesses of quantitative researchers (positivist) is the reliance on things that can be observed and measured, thus all matters related to people's perceptions are excluded from the research (Guba & Lincoln, 1994; Phillimore & Goodson, 2004). Detaching from people's perceptual issues can lead to misconception of people's vulnerability leading to proposing inappropriate adaptation strategies. Furthermore, for quantitative researchers (positivist), a researcher must be knowledgeable, meaning that only a qualified researcher is capable of producing knowledge (Phillimore & Goodson, 2004). For this argument, I considered qualitative research as suitable for this study (interpretivist), understanding complex social world needs to consider views of those who operate within it. Given all these strengths of qualitative research, I considered qualitative research methodological approach as best for this thesis. In addition, qualitative research offers a wide range of research designs, (also called strategies) which can be used to understand complex phenomena (Baxter & Jack, 2008). However, Not all designs fits into all situations.

4.4 Research design

Qualitative research offers designs such as narratives, phenomenologies, ethnographies, grounded theory and case studies (Cresswell, 2003). Depending on the research questions addresses in this thesis, and after reading the case studies under qualitative research, I considered not all designs fit into my situation. As a result, I considered case study as the appropriate research design (strategies of inquiry), based on assumptions about knowledge claims (as explained in section 4.4.1), that it provides specific direction for understanding (Creswell, 2003) vulnerability and adaptation phenomena.

4.4.1 Case study research design

The case study research 'is an in-depth examination of an extensive amount of information about very few units or cases for one period of time or across multiple periods of time' (Pearce et al., 2011, p. 42). Miles & Huberman, (1994) defined a case study as 'a phenomenon of some sort occurring in a bounded context' (p. 25). As such, a case study is a research strategy that enables a researcher to develop an understanding of the complexity and dynamism of phenomena (e.g. vulnerability and adaptation to climate change) present within a given context (Baxter & Jack, 2008; Eisenhardt, 1986,

p. 534). The case study allows the researcher to use a variety of data sources to explore individuals, groups or organisations, simple and complex interventions, relationships, societies and/or programs (Pelling, 2010; Woods et al., 2002). The case study is a flexible research design (Baxter & Jack, 2008), and as such it allows for manipulation of research question as the research progresses, so to enable greater understanding of phenomena.

The selection of a case study along with setting out an agenda for studying the chosen units of analysis remains the task of a researcher (Seawright & Gerring, 2008). The researcher's decision to use a case study is generally guided by the purpose of the research (Baxter & Jack, 2008). The purpose of a study can be to understand a process, to evaluate a program, or to make comparisons of phenomenon based on given criteria (Yin, 2009). Similarly, the purpose of a study can be to provide descriptions of a phenomenon and to generate theory (Baxter & Jack, 2008; Eisenhardt, 1986). The focus of this thesis is to use the chosen case study (the Ngorongoro Conservation Area) to understand in greater detail and describe the processes and actions that influence vulnerability and adaptation to climate change in NCA tourism system, with the ultimate aim of developing a theoretical climate change adaptation framework appropriate for Tanzanian wildlife tourism.

The selection of a case study research methodology in this thesis is based on the following reasons: to answer the 'how', 'why', 'what', 'who' and 'where' questions (Woods et al., 2002) as these apply to the studies related to understand vulnerability and adaptation to climate change (Smit & Pilifosova, 2003); to understand in greater details the decision making behaviours of those people involved in the study area (e.g. why people choose certain action over others?) (Baxter & Jack, 2008); to address contextual issues that can influence exposure, sensitivity and adaptive capacity, because of the fact that these issues are relevant to climate change vulnerability and adaptation; to understand the link between the studied phenomena and the context in which these occur, for instance, adaptation and sustainability. Furthermore, de Vaus (2001) proposes that a case study is best suited to the study: which needs data from various sources, or which allows for the application of multiple data collection methods; and where the introduction of interventions is considered as impossible. Baxter and Jack (2008) suggest that the case study approach is appropriate in exploring phenomena that

is uncertain or ambiguous, like climate change. In the context of climate change, the case study approach is commonly used in vulnerability assessment (Calgaro & Lloyd, 2008; Eriksen & Kelly, 2007). All these reasons are relevant for NCA.

Considering the types of case studies is also an important element of a case study research. This is because there are a variety of case studies but not all fit into all research questions (Baxter & Jack, 2008; Hennink et al., 2011). The commonly three types of case studies that most researchers use to understand phenomena include: single case; single case with embedded units; and multiple case studies. The details of each of these categories are shown in Hancock and Algozzine (2006), Baxter and Jack (2008) and Yin (2009). This thesis utilised a single case study with embedded units. According to Baxter and Jack (2008), single case study with embedded units is appropriate in studies that deal with one particular issue (e.g. climate change adaptation) but that involves decisions from a variety of stakeholders. This type of case study enables the researcher to explore the case while considering the influence of the various stakeholders in decision making. In other words, this type of case study allows for a holistic examination of vulnerability and adaptation to climate change in NCA. For this thesis, Ngorongoro Conservation Area (NCA) wildlife tourism system represents a single case study with embedded units (i.e. local communities, tourism businesses and wildlife resources) because it contains all the elements of a case study with embedded units.

4.4.2 The research area: Ngorongoro Conservation Area

Given these types of case studies, NCA (as shown in Figure 4-1) was chosen as a case study with embedded units (human and environmental units) in which the intention was to use it to understand processes and actions responsible for influencing vulnerability, adaptation and resilience of NCA. Located in northern Tanzania, NCA is both unique and a typical representative of wildlife tourism destination that truly represent a coupled human-environment system. This is due to frequent interactions between human and environmental systems. As introduced in section 1.4, there is a possibility of multiple vulnerabilities as well as adaptations arising from complex interactions between human and the environment and the complexity of NCA ecosystem.

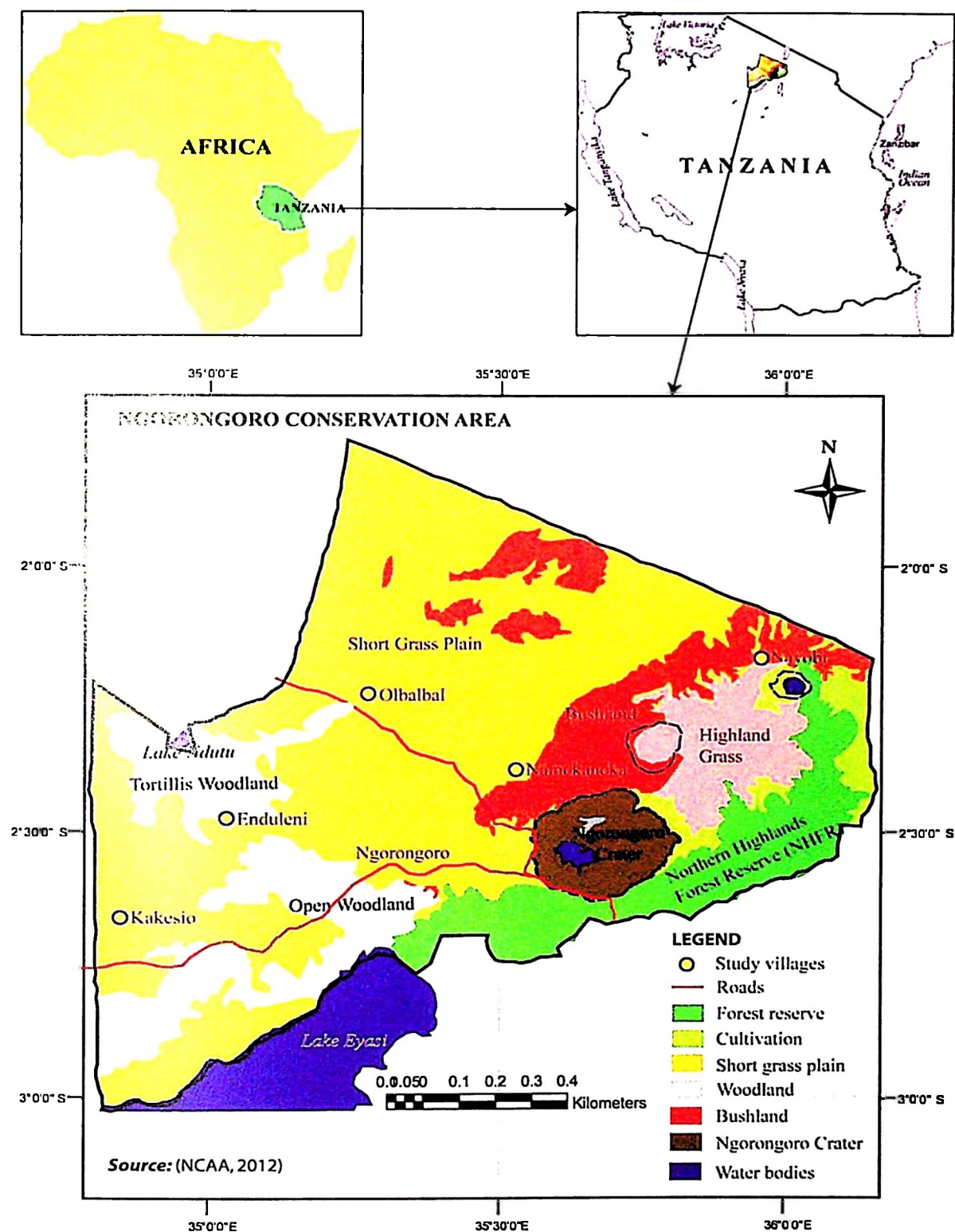


Figure 4-1: Map showing the study area

The Ngorongoro Conservation Area is a component of Serengeti-Mara ecosystem which is an area estimated to be some 25,000km² on the border between Tanzania and Kenya (Sinclair, 1995). The ecosystem is defined by the movement of migratory wildebeests, zebra and gazelles. In addition to NCA, the Serengeti-Mara ecosystem

covers several other PAs such as Serengeti National Park (SNP), Maswa Game Controlled Area (MGCA), Ikorongo Game Controlled Area (IGCA), Gurumeti Game Controlled Area (GGCA), Masai Mara National Reserve (MMNR), Loliondo Game Controlled Area (LGCA) (Sinclair, 1995) and Lake Natron Game Controlled Area (LNGCA). The Eastern part of LGCA extends also to Amboseli National Park in Kenya. The only difference between NCA and the surrounding PAs is that in NCA indigenous people co-exists with wildlife within single settings whereas in other PAs people are prohibited to establish homes. However, tourism and research are allowed in all mentioned PAs. Figure 4-2 shows the Serengeti-Mara ecosystem.

Figure 4-2: Map of the Serengeti-Mara ecosystem

Given the complexity of NCA, there is need to study this coupled human-environmental system in a holistic perspective, where various interconnected components are simultaneously studied. In such a study, systems theory is applied, as highlighted in the following section.

4.4.3 The systems theory in tourism research

The systems theory is a theory that enables us to understand interconnectivity and complexity of phenomena (Baggio, 2008; Catlin, Jones, & Jones, 2011; Leiper, 2004; Mayaka & Akama, 2007; Zurlini et al., 2006), for example the interconnectivity and complex relationships between human and environment, local community and tourists, tourists and wildlife to mention a few (Becken & Hay, 2007). The system theory is relevant to qualitative research and research design such as case study with embedded units. A system is defined as a set of interrelated, interdependent and interacting elements that together form a single functional structure (<http://www.thefreedictionary.com/system>, retrieved on 21/03/2014). A systems approach is applied to tourism because tourism operates as a system involving the complex interaction of interconnected components in scale, time and space.

The systems theory rests on the assumption that there is a strong interconnectedness between components that make up a system, to the extent that impacts on any one of these components can affect the whole system (Baggio & Sainaghi, 2011). The systems approach, emerged to overcome the deficiencies encountered in quantitative reductionist studies where researchers disaggregate the system components and investigate them individually, with a view that their sum would give a complete understanding of the whole system (Baggio & Sainaghi, 2011; Leiper, 2004; Mayaka & Akama, 2007; Stevenson et al., 2009; Strickland-Munro, Allison, & Moore, 2010). For example, monitoring tourist flow or measuring discrete relationships between variables, such as tourist expenditure, employment, visitor numbers and social impacts (Carlsen, 1999). According to Baggio, (2008) under quantitative researchers, researchers believed that the information generated from a single variable of a system, can be used to predict the future behaviour of the whole system. In this regard, the quantitative researchers support theories that assume the existence of simple and linear relationships between system

variables (Stevenson, Airey, & Miller, 2009). As a result, there is a general failure by quantitative researchers to attain a balanced management in systems involving complex interactions.

Wildlife tourism is an example of a complex, coupled human-environmental system comprising many interacting social and environmental systems. A complex system is 'a system for which it is difficult, if not impossible, to reduce the number of parameters or characterising variables without losing its essential global functional properties' (Baggio, 2008 p. 5). This system is characterised by the presence of: a large number of elements that exhibit non-linear relationships; feedback loops between system elements (Liu et al., 2007; Strickland-Munro et al., 2010; Walker et al., 2009); and elements are usually open to external factors (e.g. climate change) (Baggio, 2008). The application of a systems approach in enhancing sustainable wildlife tourism emerged following the realisation that it is difficult to understand the wildlife tourism system by simply examining one of its components, either social or the natural environment, but rather combining them into one system (Zurlini et al., 2006).

The application of the systems theory is extremely important in adaptation to climate change (Scott, et al., 2012). As adaptation in wildlife tourism requires the involvement of multiple actors, the systems (holistic) approach becomes a useful tool for addressing the challenges arising from a diversity of stakeholders (Mayaka & Akama, 2007). This is particularly relevant in a situation where adaptation involves stakeholders with competing goals and interests. The systems approach then helps to understand how coordination can be achieved without an individual stakeholder or group undermining the views of other stakeholders (Mayaka & Akama, 2007). However, due to contextual differences among various levels of the system, the effectiveness of the systems approach application may depend on the levels or scales of analysis.

The systems theory recognises that in a complex system, there are various interactions between systems operating at lower scales or higher scales over time and space (Holling & Gunderson, 2002). The systems approach allows for a system to be viewed from micro to macro scales (McIntosh, Goeldner, & Ritchie, 1995). It can apply to whole systems or subsystems, and to various spatial scales such as: local/site/project; locality; region (supra-national); national; or international (Getz, 1986; Strickland-Munro, 2010).

This is because what is considered as a scale at one level of a tourism system may itself comprise a complex system, making that particular scale a complete unit of analysis (Strickland-Munro, 2010). Therefore, from my point of view, the best way to apply the systems theory is to look at the scale that can allow for greater understanding of the research problem. This thesis applies the systems (holistic) approach to address climate change adaptation in wildlife tourism systems at the local scale. The case study methodology is deemed suitable for the localised study.

4.5 Research methods

There are various methods that can be used for qualitative research. Commonly used methods include: in-depth interviews, focus group discussions (FGDs), observations (Ezzy & Liamputtong, 2005; Hennink et al., 2011). Each of these methods has advantages and limitations. However, the nature of a study forces a researcher to adopt a particular method best suited to the studied context. One important consideration is for the method to help the researcher achieve the desired outcomes. This study adopted in-depth interviews and FGDs as the main methods for data collection. However, other methods such as informal conversation, observations and the analysis of secondary data were used to provide supplementary information.

4.5.1 In-depth interviews

This is a data collection method that involves one interviewer and one interviewee discussing a topic in greater detail (Ezzy & Liamputtong, 2005; Hennink et al., 2011). According to Ezzy and Liamputtong (2005), the in-depth interview concept is also used interchangeably with the terms: unstructured interviews, non-directive interviews, open-ended interviews, active interviews and semi-structured interviews. Although the in-depth interviews involve a researcher (interviewer) and interviewee (participant) discussing a topic, in essence the method is not a two-way dialogue (Ezzy & Liamputtong, 2005; Hennink et al., 2011). It is simply a more focused 'conversation' in which the interviewee tells a story and the role of the interviewer is to elicit the story by recording and asking more questions (i.e. probing). This motivates the interviewee to share their perspectives in more detail. In brief, the in-depth interview method is described as a 'meaning making partnership' between a researcher and an interviewee

and in so doing, the method is considered as a 'knowledge producing-conversation' (Hennink et al., 2011, p.109).

The in-depth interview method has many advantages as stipulated in Ezzy and Liamputtong (2005). One advantage relevant for this study is its high degree of flexibility. For example, in quantitative research interviewers need to administer questionnaires using the same words and in the same way, but in qualitative research in-depth interviews do not have to follow this rule (Ezzy & Liamputtong, 2005). During in-depth interviews new questions can arise as the research progresses depending on prevailing circumstances and the need, by a researcher, to gain more knowledge of the discussed topic (Bryman, 2001). In so doing in-depth interviews provide an opportunity for the development of new insights and theories during the research process (Ezzy & Liamputtong, 2005). Another advantage important for this study is that in-depth interviews provide a far-reaching understanding of social processes and interactions when compared to other methods of data collection (Ezzy & Liamputtong, 2005). The interactions can be between humans or between humans and their natural environment. Furthermore, in-depth interviews help to maintain anonymity, since the presence of a respondent is less influenced by the presence of their peers (Ezzy & Liamputtong, 2005).

One key limitation of this method is that it cannot always give full and/or accurate information, especially if done by a research assistant. Therefore, to do well with this method, in-depth interviews need to be conducted by the principal researcher, because of their perseverance and sensitivity to complexity issues arising from interpersonal interactions (Daly, cited in Ezzy & Liamputtong, 2005). Because of this requirement, the interviews for this thesis were fully conducted by the principal researcher. Furthermore, for the best research results/outcomes, it is also advised to supplement in-depth interviews with other research methods such as FGDs and observations. Given this requirement, a FGDs method was also applied in this research.

A critical aspect of in-depth interviews is preparation, and an understanding of the types of questions to be asked and the particular interests of the researcher in relation to a particular participant (Berg & Lune, 2004). In this way, these interviews are 'semi-structured', in that the interviewer goes to the interview with a list of topics, questions

and a guideline to help structure and focus the interview (Patton, 1980). As part of preparation for interviews, there were two phases of data collection. Phase one took place between January and May 2011 and phase two, between January and May 2012. Phase one was more or less a scoping exercise dominated by the need to introduce the research to the audience, and to gain an understanding of the case study (i.e. the NCA tourism system) and the research participants. Understanding gained from this initial visit formed a ground for developing instruments for in-depth interviews, and FGDs. Examples of semi-structured interviews are shown in Table 4-3 and Appendix B-1a & B-1b.

Since this study was undertaken in a protected area and involved human research, compliance of legal and/or ethical issues was a prerequisite even before commencing phase one of the research. Compliance to ethical issues involved the following procedures: the application for ethics compliance at both Victoria University and Ngorongoro Conservation Area Authority (NCAA), including the application for a permit to conduct research in NCA; the introduction of the researcher and the research to NCAA; and, preliminary field visits to understand the geography of the research sites and to identify research participants.

The data collection exercise began after these compliances were met. Documents (both grey and academic literature) for secondary data were collected. In phase 1, informal conversations, observations and note-taking were the main tools for data collection. Phase 2 involved developing interview questions and conducting interviews to understand shocks and stressor events, exposure, sensitivity and adaptive capacity of the studied system. Semi-structured interviews and FGDs were the dominant methods of data collection in phase 2, although the informal conversations and observations also supplemented the data. Where unsatisfactory answers to open-ended questions were provided; the probing technique was used based as suggested by Bickman & Rog (2009), to capture additional information from interviewees.

4.5.2 Focus group discussions

A focus group discussion/interview 'is a qualitative method adopted with the primary aim of describing and understanding perceptions, interpretations, and beliefs of a

selected population in order to gain understanding of a particular issue from the perspectives of group participants' (Khan & Manderson, cited in Ezzy & Liamputtong, 2005, p.76). It involves groups of people (normally about six to ten) coming from social and cultural backgrounds with similar experiences or concerns (Ezzy & Liamputtong, 2005).

Focus group discussions have many advantages as outlined in Ezzy and Liamputtong (2005). The particular advantages relevant for this study are that: this method enables in-depth discussions of phenomena and involves a relatively small number of people; it is focused on a specific topic of interest that allows participants to discuss it in great detail; it is a group discussion that relies on the interaction between participants, rather than a group interview; and through discussion, FGDs allow people to explore and clarify issues from their own views.

4.5.3 Informal conversations

Informal conversations are a method adopted to capture information deemed important but that was difficult to obtain from FGDs and in-depth interviews. This method is almost similar to in-depth interviews, except that an interviewee was approached informally. In most cases this occurred when the researcher wanted to gain an understanding of what the interviewee was captured doing. Similarly, informal conversations were adopted to capture information from participants who disliked formal interviews. These conversations were combined with observations when the researcher wanted to gain immediate details or seek clarification of an observed phenomenon. Table 4-1 presents a summary of the methods used in this research.

Table 4-1: Summary of data collection methods

Research method	Purpose	Sources
In-depth interviews (semi-structured interviews)	To gain information about people's actions & reactions, motives and meanings in the context of their everyday life (Minichiello, 1995).	Data were collected from: members of local community, Hoteliers/lodgers and conservationists.
Focus group discussions (FGDs)	The method is used in order to: gain information about peoples' perceptions, thoughts, feelings and impression in their own perspectives (Ezzy	Data were collected from members of the host community.

	& Liamputtong, 2005; Stewart and Shamdasani, 1990); and insights of what actions are required to deal with negative events (Klint, 2013). FGDs were adopted in order to explore people's knowledge and experience about climate change.	
Informal conversations and observations	This was applied in order to capture information that was difficult to obtain from FGDs and in-depth interviews.	Members of the host community, conservation staff and tour guides/drivers.
Analysis of secondary data	Analysis of secondary information provides the information necessary to understand contexts (Patton, 2002). In particular, secondary data helped to avoid repetition of data collection and therefore, saves time.	Various reports about NCA, Tanzanian newspapers, NCAA brochures and statistical data (longitudinal data) collected over a certain period of time.

Source: Adapted from Klint (2013 p. 105).

4.6 Sampling

This section presents a discussion of how the population used for data collection in this study was obtained. The purpose of sampling is to provide guidance to proceed with the research (Ezzy & Liamputtong, 2005). Given that the aim of this thesis is to develop a conceptual framework for climate adaptation in the wildlife tourism sector, sampling included the identification and selection of information-rich people, who will provide meaningful interpretations and/or explanations of climate change vulnerability and adaptation processes for a studied unit or system. Information-rich people 'are those from which one can learn a great deal about [the] issue of central importance to the research purpose' (Coyne, 1997, p. 624).

The units of analysis were chosen from the local wildlife tourism system scale. Key components that make up the NCA tourism system at the local level were identified and used as units of analysis. Key system components include local community (i.e. The *Maasai*), natural resources conservationists (the government representatives who provided information about wildlife and their habitat) and tour operators (hotel/lodges and tour guide companies).

4.6.1 Sampling techniques

There are various sampling techniques used in qualitative research as outlined in Patton (2002, p. 230-242) and Ezzy (2005, p. 46-48). These include convenience, purposeful,

and snowball or chain sampling. All these techniques are considered effective, depending on the context under investigation and the desired outcomes. In some circumstances, these techniques are used in combination in order to obtain the best research results or outcomes (Ezzy & Liamputtong, 2005). Given the nature of the study area, a combination of convenience, purposeful, and snowball or chain sampling methods were adopted to select participants.

A convenience sampling technique was adopted because it is cheap, easy and time saving (Ezzy & Liamputtong, 2005), given this study was associated with limited time and budget constraints. According to Reynolds and Braithwaite (2001) convenience sampling is the sampling technique that uses the most convenient and accessible people to participate in the research. However, the only limitation of a convenience sampling is that it assumes a homogeneous sample (Ezzy & Liamputtong, 2005) and, as such, it does not allow for generalization of theory (Patton, 2002). Thus Ezzy and Liamputtong (2005) suggest that the method could be considered 'less desirable'. However, Ezzy and Liamputtong (2005) suggest that if the research circumstances force the application of this method, it is advisable to use it in combination with other methods. This is the major reason why other research methods, such as purposeful and snowball sampling, were also used in this research. Schatzman and Strauss (cited in Coyne, 1997) state that as the study progresses and familiarity with the site has been gained, the researcher may discover new inquiries which can lead to more sampling. This involves the identification and selection of new participants for further research. Schatzman and Strauss (cited in Coyne, 1997 p. 624) state that 'selective (purposeful sampling) can be adopted and it is a practical necessity that is shaped by the time the researcher has, by his framework, by his starting and developing interest and by any restriction placed upon his observations'. Purposeful sampling also includes the identification and selection of time, place and events to improve research findings (Coyne, 1997).

Hennink et al. (2011, p.100) state that a 'snowball sampling (also called chain sampling) is a method of recruitment suitable for identifying participants with very specific characteristics, rare experiences or hidden population group who may be difficult to identify with other recruitment methods'. Ezzy and Liamputtong (2005, p.47) states that, 'this type of sampling method may be useful when the people being studied are strongly networked and difficulty to approach directly'. Initial respondents

or a group of respondents may assist to identify other people who are willing to provide extra information (Ezzy & Liamputtong, 2005). Given that this research adopted a holistic (systems) approach, adoption of snowball sampling in this research helped to identify information-rich people across the NCA wildlife tourism system. This was the reason for the application of snowball sampling methods, particularly for the recruitment of local community participants.

4.7 Data collection

This section presents the process followed to collect data for this study. The climate change adaptation framework developed in chapter three facilitated this process. The framework provided key themes that guided the process of data collection, which include: shocks and stressors, system exposure, system sensitivity and system adaptive capacity. The major inquiry was to use these themes to guide the identification of main shocks and stressors as well as factors and processes determining exposure, sensitivity and adaptive capacity of the NCA tourism system to the identified shocks and stressors.

The data were collected by using in-depth interviews, FGDs, and informal conversations supplemented with observations. As this thesis adopted a systems theory (holistic approach), these methods were applied to collect data across the main components of the NCA tourism system, which include the local community, tourism businesses (hotels and lodges), conservationists (for wildlife and their habitat) and tourists. The time frame for data collection from in-depth was 1.5 hours, where as for FGDs the time frame was 2 hours. For FGDs respondents were recorded with a tape during discussions, whereas for PA managers recording were not accepted by participants and only a field note book was used to record discussions. Qualitative data collected from primary and secondary sources were triangulated in order to produce a greater understanding of shocks and stressors, and factors or processes that determine exposure, sensitivity and adaptive capacity of the NCA tourism system to shocks and stressors. While the primary data were mostly used to understand key shocks and stressors, secondary data mainly reports, journal articles, newspapers and brochures were sourced to understand the NCA's tourism system and its boundaries and to provide additional information that would support the results discussion.

To access respondents from the local community, five villages out of 14 in NCA were purposively sampled for collection of primary data. Geographical location of villages was the major selection criteria for villages. This means that there was a need to access villages located in both arid and semi-arid areas. Criteria used to select participants from villages included the age of respondents (to abide with ethical issues, respondents were 18 years old and above). In some cases purposeful sampling of participants who were above 40 years was applied in order to capture their longer experiences of living in NCA. The major assumption was that these participants could tell the difference between the current climate/ or events and the previous ones. The village leaders and one NCAA tour guide assisted with the selection of participants. A total of 50 participants (11 in phase 1 and 40 in phase 2) participated. Selection of hotel/lodges participants was based on their convenience. For example, in most of the visited hotels/lodges junior employees were not allowed to provide information to researches. Therefore, only managers or their assistants participated. The government officials were selected based on their authority, especially those with the highest authority in decision making. In this regard, the NCA's top officials were mostly involved in order to capture their opinions on the risks of climate change in NCA. However, some NCAA junior staff also showed interest to participate and the informal conversations were the most convenient methods of collecting data from them. For the local community, data were collected in cultural *bomas*. These are special places where indigenous people practice cultural tourism. For hotel participants and conservationists data were collected at their respective rooms and offices. But with tour guides (tour drivers) data were collected in their respective cars. Table 4-2 presents the sample population for this study and Table 4-3 presents these themes and the associated interview questions.

Table 4-2: Number of participants

Key system component	Number of participants		Total
	Phase 1 data collection	Phase 2 data collection	
Local community	11	40	51
Hotel/lodge operators	4	4	8
Tour guides/operators	8	12	20
PA managers	2	5	7
TOTAL	25	61	86

Table 4-3: Research themes and interview questions

Sample interview questions			
Research theme	Tourism enterprises	Host community	P.A managers
Shocks and stressors	<ul style="list-style-type: none"> What events have affected your business in the past 20 years? 	<ul style="list-style-type: none"> What events have affected your livelihoods in the past 20 years? 	<ul style="list-style-type: none"> What events have affected wildlife and their habitat in the past 20 years? What events have affected your efforts to promote local livelihoods in the past 20 years? What events have affected tourism in the past 20 years?
System exposure	<ul style="list-style-type: none"> In your opinion, what event (s) do you consider the most risky to your business in the future? Have you experienced any damage from the events you mentioned? 	<ul style="list-style-type: none"> What type of resources do you need to support your livelihoods? In your opinion, what event do you consider the most risky to your livelihoods in the future? 	<ul style="list-style-type: none"> What resources do you consider as the most threatened by the events you have mentioned? In your opinion, what event (s) do you consider the most risky to conservation in the future?
System sensitivity	<ul style="list-style-type: none"> What type of destination is NCA? Who are the main markets for the destination and why? What are the main tourism seasons in NCA? Is your business affected by tourism seasonality? 	<ul style="list-style-type: none"> What are your main livelihood options? How is tourism important to you? Have you experienced any damage from the events you mentioned? What training and skills are available for you? 	<ul style="list-style-type: none"> What type of destination is NCA? Who are the main markets for the destination and why? Have you experienced any damage from the events you mentioned? What training and skills are available for you?
System adaptive capacity	<ul style="list-style-type: none"> Are there any local, national and/or regional emergency recovery plans in place? How these plans do helps you to adapt/cope with the damage you have mentioned? Are you involved in deciding what to include in those plans? 	<ul style="list-style-type: none"> Are there any local, national and/or regional emergency recovery plans in place? How these plans do helps you to adapt/cope with the damage you have mentioned? Are you involved in deciding what to include in those plans? 	<ul style="list-style-type: none"> Are there any local, national and/or regional emergency recovery plans in place? How these plans do helps you to adapt/cope with the damage you have mentioned? Who is responsible to develop those plans?

4.8 Data analysis

Data analysis is an important stage in the research process as it facilitates the transformation of data into findings (Patton, 2002). Findings help to justify assumptions, draw realistic meanings and develop theories. As this thesis involved two stages of data collection, there were also two stages of data analysis.

As stated in section 4.7, the purpose of stage 1 data collection was to capture the information necessary to describe the context of the NCA tourism system. Similarly, there were some primary data collected from the NCA authorities and villagers that helped to clarify some issues. The secondary data and the primary data from authorities and villagers provided additional information for describing the context of the NCA tourism system. The volume of data from stage 1 was generally not too large and as such easy to manage. Manual analysis of the information was possible. Manual analysis involved organising data by using card boards for describing the tourism system. That is, cards were labeled according to the system components: local community, tourism enterprises and conservationists. Information falling under each of these subcomponents was placed with the respective card. In this case, there was a minimum use of computer software for data analysis. However, secondary data involving trends (e.g. of rainfall and animal population) were analysed in Excel computer software to generate trend diagrams.

The purpose of stage 2 data collection was to identify shocks and stressors and to understand the factors that determine exposure, sensitivity and adaptive capacity of the NCA wildlife tourism system. A large volume of data was collected and it was not easy to handle and analyse manually. Therefore, a sophisticated package, the NVivo (version 9) software, was used to analyse data. NVivo is a sophisticated computer program that helps to manage and retrieve (complex) data (Bazeley & Jackson, 2013; Crowley, Harré, & Tagg, 2002; Crowley et al., 2002, Marshall, 2011). This software program facilitates filing and quick display of filed data (Marshall, 2011). However, one limitation of this package is that the program does not decide for the researcher 'what to seek' nor 'what it means' (Marshall, 2011). This implies that deciding what to do with and drawing meanings from the analysed data are not the tasks of NVivo, but the tasks of the researcher.

The analysis of data using NVivo involved the initial coding of key themes in order to organise the responses from interviewees according to themes. Based on the WTVAF framework, as previously mentioned, the key themes were shocks and stressors, exposure, sensitivity and adaptive capacity. A coding tree was also used. The theme 'shocks' was coded as a parent node and the identified shock events were enlisted and coded under the parent node as sub-themes. The shocks included political instabilities, terrorism, disease outbreaks and weather extremes. This means that any information related to these sub-themes was recorded under each respective sub-theme. The theme 'stressors' was coded as a parent node 'stressor', and the enlisted sub-themes included water shortages, environmental degradation, biodiversity loss and changes in vegetation.

Key determinants of vulnerability (exposure, sensitivity and adaptive capacity) were coded as separate parent nodes. The identified factors were coded and matched as sub-themes under each of the parent nodes. For example, the factors that were found to influence the NCA's exposure to shocks and stressors were coded as sub-themes under the parent node 'exposure'. The exposure factors identified during data collection include increased human populations and alteration of biophysical characteristics. Under the biophysical characteristics, the influence of topography and the usage patterns of natural resources were coded as sub-themes. Furthermore, under sensitivity, factors such as tourism specific sensitivities and access to resources were coded as sub-themes. Tourism seasonality, destination positioning and destination image were sub-themes under 'tourism specific sensitivities' and land tenure sensitivity was coded under the sub-theme 'types and accesses to resources'. Moreover, under the 'adaptive capacity' node; factors that facilitated adaptive capacity were coded as sub-themes. These include emergency responses, police intervention, preparedness and coping strategies.

4.9 Limitations

This section discusses the limitations encountered during data collection. It also presents the approaches applied to mitigate those limitations. The major limitations encountered include: time and budget constraints; information sensitivities associated with the social and psychological risks of running FGDs; cultural sensitivities; language

barriers; and perceptions/unfamiliarity of climate change topic among participants of this research.

4.9.1 Time and financial constraints

Time and budget issues are acknowledged by many researchers (Ezzy & Liamputtong, 2005; Hennink et al., 2011; Patton, 2002) as having greater influence in research success. This is because the research success is measured by the extent to which research objectives are met (Ezzy & Liamputtong, 2005). The time and money, available to the researcher can enhance or hinder the achievement of research objectives. While the effect of money manifests during the selection of a sample size (Patton, 2002), the time available for a researcher and/or for interviewees can influence the amount of data to be collected. Consequently, this may lead to unrealistic conclusions.

In this research work, the issue of time constraints appeared when the researcher was in the field. During the execution of this research, there were some circumstances where the researcher was available for interviews but the interviewees (especially formal employees) were not ready, even though appointments were made in advance. In most cases the targeted participants (employees) offered many excuses, saying they were occupied with other official duties. This issue was however addressed by adopting an informal conversation and phone interviews with respondents who seemed to prefer these methods, rather than having formally arranged meetings.

There was also significant time lost when the researcher was securing the permit to undertake research in NCA. The first permit was timely released by the Tanzania Wildlife Research Institute (TAWIRI), in collaboration with NCAA. TAWIRI is the organisation responsible for releasing the research permit after a researcher has adhered to the necessary application requirements. Normally, TAWIRI do this in collaboration with NCAA. However, the permit was rejected at the gate when the researcher wanted to use it to enter NCA. The reason was that NCAA was not involved in the process of releasing the permit. The researcher was then requested to re-apply for the permit directly from NCAA. This delayed data collection. Almost two months were spent following up on the release of the permit. This time and the money could have been

used for research activities. However, there was an apology made by the NCAA officer in charge of releasing permits as it was discovered later that the first permit was valid. Oddly enough, the officer who signed the rejected permit was the same person who signed and released the second permit. This limitation was corrected by extending the time allocated for data collection, although it affected the time and money allocated to complete the research, as well as the time taken to discuss the findings.

Similarly, the nature/geography of the research area influenced the time allocated for data collection. NCA is considered, by many researchers, as being the most difficult area to access data. This is because the area is regarded as having the most sensitive ecosystem in Tanzania. Due to this issue, people's entry and exits are highly monitored. There are regulations set to limit people entering and those working in NCA. This together with the presence of dangerous wildlife affected the freedom of the researcher to move from one place to another, especially to access respondents. There are only a few affordable guest houses in NCA. Most of the available tourist hotels/lodges are very expensive and not affordable for a student with limited funds. As a result, the researcher had to spend nights outside NCA at Karatu town (over 30km away). This meant more time and money, because the researcher had to hire a 4WD vehicle and purchase fuel every day. The time limitations were however addressed by phone interviews or informal conversations wherever respondents were found available and ready to participate.

4.9.2 Information sensitivities arising from social and psychological values

Information sensitivities have been considered by other researchers as 'social and psychological risks of running group discussions' (Esterberg, 2002 p. 46). However, in this thesis, it is referred to as 'information sensitivity' because it is concerned with not only group discussions but also with other methods of data collection such as in-depth interviews and/or informal discussions (involving a single respondent). Information sensitivities or 'psychological risks' may relate to privacy issues that arise as the participant reveals him/herself to the researcher or the group, 'hindering the assurance of absolute confidentiality' (Esterberg, 2002 p. 46). 'This is [of] particular concern if very sensitive issues are discussed, and can present a serious issue in group discussion' (Esterberg, 2002 p. 47) or during a one-to-one in-depth interview.

Social risks arise when participants share their point of view within a social context that involves people with different power status (Esterberg, 2002). ‘This may make participants feel uncomfortable when sharing information with the researcher’ (Esterberg, 2002 p. 48).

Information sensitivity was evident during this research especially when almost all respondents refused to be recorded during discussions or interviews. Even for those who were recorded, they later asked the researcher to erase the recorded message, for fear that if the information was stored it may have negative implications on their job or life.

To overcome the effects of information sensitivities, the researcher adopted the following actions: (1) in-depth interviews and FGDs, participants were given the opportunity, prior to commencement of interviews, to raise concerns that might limit their effective participation. As stated above, most of the participants were concerned that the information they provided would have some implication for their daily activities. However, they were assured that the information would be kept confidential and was for study purposes, not for government investigation. Those who had influence in the society, especially the indigenous society, were consulted before interviews and they helped to clarify issues of confidentiality. Similarly some participants approached the researcher privately and asked if they could be interviewed in the place of their interest. This was acknowledged and the location was decided.

4.9.3 Language barriers

Language was not a barrier with conservationists or tour operators because most of them are fluent in English and Kiswahili. The Kiswahili language was mostly used because the researcher is a Tanzanian and can speak both Kiswahili and English. However, language became a barrier during focus group discussions with the host community/indigenous people (Maasai). Most of the local community members speak their native language (Maa), which was not known to the researcher. To overcome this barrier a research assistant, who speaks Maa, English and Kiswahili languages, and who does not come from the community involved (i.e. a neutral assistant), was employed to assist with translation.

4.9.4 Cultural sensitivities

The Maasai has strong ties as a tribe with their culture. One of the cultural barriers experienced in data collection of this research was that they could not allow any person who is not a Maasai or familiar with them, to collect information from their villages. Therefore to overcome this barrier, a full-time research assistant, who was also a tour guide, was hired to introduce the researcher to the participants at every meeting.

4.9.5 Perceptions/unfamiliarity of the topic

Climate change is a topic that connotes different perceptions among people. Significant discouragement by some of the formal employees was encountered earlier from the introduction of the research to different stakeholders. Surprisingly, this discouragement arose from some of the educated staff (from both private and government sectors). There were people who have no interest in climate change issues and this attitude became a barrier for the data collection process. For example an appointment was made with a manager from one Lodge in NCA. After reading the invitation letter, the manager decided to withdraw from the discussion which was scheduled for the following day. He made the following argument to justify his refusal:

‘There is nothing like climate change. For this, I am not interested ... I would be interested to participate if you would come to research about tourists’ financial situations but not climate change... there’s nothing like climate change’.

This situation occurred also with some tour guides and even with some NCA government authorities. However, there were other employees who had an interest in climate change issues and they are the ones who participated fully. Furthermore, following the recognition that some employees are not interested in climate change, in subsequent interviews, a probing technique was used to probe on climate change issues without necessarily mentioning climate change.

4.10 Chapter summary

This chapter presented the methodology used for data collection. The purpose of this chapter was to present how the framework (WTVAF) developed in section 3.4 was used in the research area to guide data collection (i.e. the case study). This is qualitative research grounded on the general systems theory (systems thinking). The central idea of the system thinking application is the recognition that a tourism system is composed of

many interconnected subcomponents/subsystems which cannot be studied by separating them. Therefore, data were collected from the major NCA tourism subsystems: the host community, tourism enterprises and conservationists. A total of 86 respondents participated in this research by providing the necessary information required to fulfill research objectives. Data were subjected to both manual and computer analysis. And the information generated is discussed in chapters five, six, seven and eight. This information helped to adjust WTVAF and develop a new conceptual framework for NCA wildlife tourism.

CHAPTER FIVE: SHOCKS AND STRESSORS

5.1 Introduction

As highlighted in chapter two, shocks and stressors are the two main categories of negative impacts that may trigger vulnerability of a system to climate change. Shocks and stressors do not cause vulnerability; but rather they reveal the patterns with which individuals, communities, businesses entities, institutions and ecosystems experience vulnerabilities (Calgaro, 2011; Calgaro et al., 2013a, 2013b; Calgaro, Pongponrat, & Naruchaikusol, 2009; Jiang et al., 2012). In other words, when shocks and stressors occur they present as a reminder of the system's strengths and weaknesses in resisting them. Analysing shocks and stressors helped the researcher to answer the question as 'to what' the NCA tourism system is vulnerable. The purpose of this chapter is to report the identified shocks and stressors that can trigger vulnerability of the NCA tourism system to climate change.

However, as presented in WTVAF, knowledge of the wildlife tourism system prior to presenting the shocks and stressors was deemed important. Understanding the system helps to describe the context and patterns within which various human and environmental interactions occur. In turn, this helps to identify key actors of the studied system and to identify *who* or *what* are faced with shocks and/or stressors. Given this requirement, section 5.2 presents the description of the NCA wildlife tourism system; and section 5.3 presents the identified shocks and stressors. Table 5-1 presents the research objective to be addressed in this chapter.

Table 5-1: Research objective addressed in Chapter 5

Research Objective	What information is needed?	How information will be gathered?	Why the method is appropriate?
2 To identify the negative impacts (both shocks and stressors) faced by the wildlife tourism system in the NCA	Description of the NCA tourism system; Identification and analysis of shocks and stressors	<ul style="list-style-type: none">• Semi-structured interviews• Focus group discussions• Observation & informal conversations• Analysis of secondary data	Helps to understand the context and those who face the shocks and stressors

5.2 The tourism system of Ngorongoro Conservation Area (NCA)

As stated in previous chapter (section 4.4.2), NCA has an ecosystem which extends to the nearby PAs. In essence this ecosystem is an integral component of the NCA tourism system. As presented in chapter one and chapter four, one of the key unique features of NCA is the co-existence of people and wildlife. Thus, the NCA tourism system really represents a coupled human-environmental system. The analysis of the NCA tourism system can focus on the local scale, the national and regional scale and or the international scale.

At the national, regional and international scale, the NCA tourism system can be described by using the tourists' destination region (TDR), the tourists generating regions (TGR) and the transit region (TR) perspectives as presented by Leiper (2004). This kind of analysis constitutes the NCA whole tourism system which is presented in Figure 5-1. However, as said earlier, this study is focused mainly on the local scale.

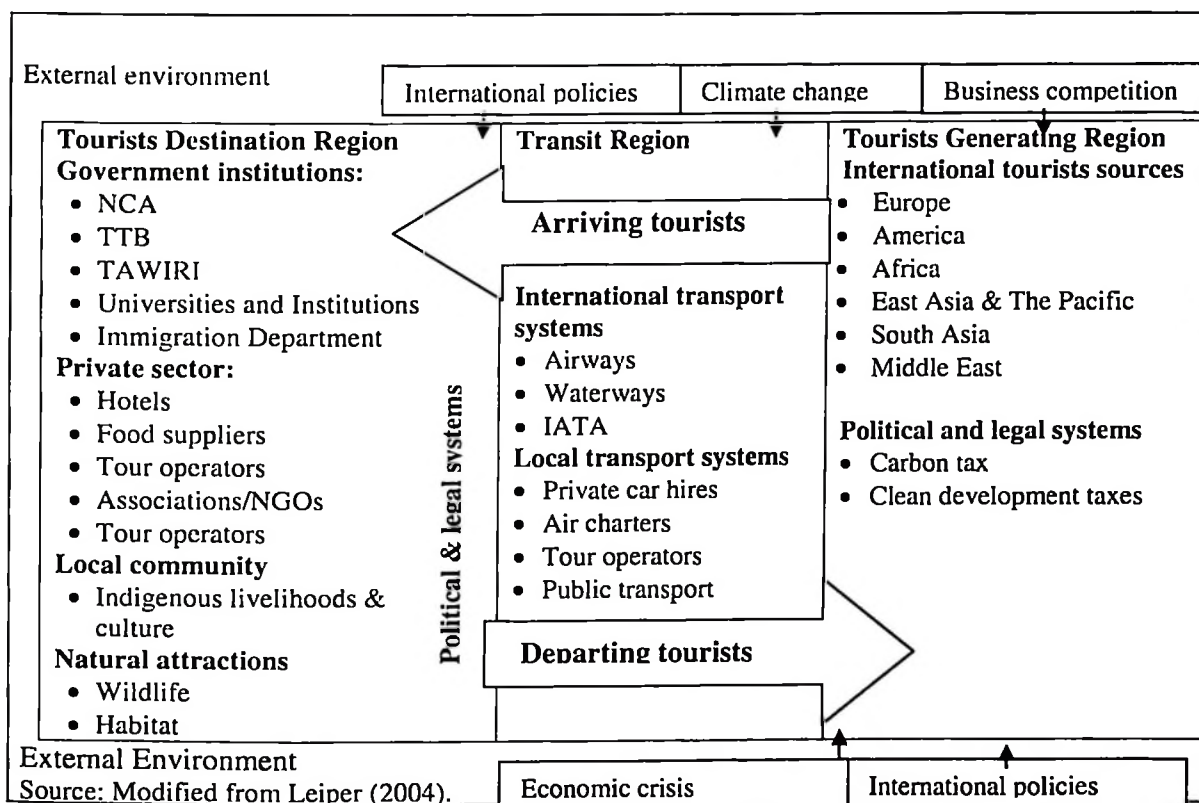


Figure 5-1: The NCA whole tourism system

At the local level The NCA tourism system consists of many interacting subsystems including: wildlife and their habitat; local community; tourism businesses (destination accommodation including food and beverage and transport sectors); government agencies (wildlife conservationists/park managers); Non Governmental Organisations (NGOs) and tourists. Each of these components plays a significant role in influencing the functioning of the system as a whole (i.e. from local to international scale) and is a key component of the NCA tourism product.

5.2.1 Wildlife and habitat

Without tourists attractions there would be no tourism. Attractions are the most important elements in any tourism system (Swabrooke, 1999). Tourist attractions consist of all those elements of the destination that draw tourists away from their usual homes and they are a primary source of other tourists services (Swabrooke, 1999). Primarily, tourists choose to visit a destination based on the appeal of its attractions and associated services. In other words, tourist attractions constitute the core of the tourism product and these are the main motivators for tourists to visit a destination (Swabrooke, 1999). It is the destination's attractions combined with the provision of high quality tourists' services that gives tourists satisfaction (Leiper, 2004). Although wildlife is the main attraction that pulls tourists from their usual environments, about 80% of tourists visiting NCA are also attracted by non-wildlife attractions such as cultures, indigenous people's lifestyles (Okello & Yerian, 2009; Melita & Mendlinger, 2013), and the harmonious co-existence of the indigenous people/local community with wildlife (URT, 2010). Some of these attractions may become vulnerable or disappear completely due to climate change. This may consequently alter the flow of tourists interested in them.

In NCA, tourists are attracted by certain natural features. The abundance of wildlife and the uniqueness of other natural attractions such as the crater and the landscapes, make NCA a unique tourism destination in Tanzania, Africa and the world (Melita & Mendlinger, 2013). The crater, which covers an area of 250 square kilometres, is considered the world's largest unbroken caldera, also called the 'cradle of mankind' (URT, 2010) or the 'Jewel in the Ngorongoro's Crown' (Melita & Mendlinger, 2011). It supports a variety of wildlife species including the rare black rhino (URT, 2010). It is estimated that the crater supports over two million migratory animal species, depending on the time of year (NCAA n.d.). The short grasses of the crater offer wet season

The survival of wildlife in the crater is supported by the water flowing from the Northern Highlands Forest Reserve (NHFR). NHFR is another tourism attraction found in NCA and a vital water catchment area which supplies water to the crater. This water is essential for migratory species, especially when water sources dry up in the Serengeti National Park (Estes & Atwood, 2006). NHFR is also an important water catchment for domestic use by the NCA community (lodges, indigenous people and the NCA staff) as well as villages outside NCA. The catchment area also provides important habitat for wildlife such as rhinoceros, elephants, leopards, buffalo and lions. In addition, the NHFR catchment offers an alternative grazing area for indigenous pastoralists, especially during critical droughts (URT, 2010). Climate change may affect some of the water catchment and consequently this may affect wildlife and tourist flow.

Wildlife and their habitat are considered among the most vulnerable component of wildlife tourism to climate change (Williams et al., 2008). Substantial studies have been conducted to ascertain how climate change may affect wildlife and habitat as well as how both may adapt (Hughes, 2000; Thomas et al., 2004; Williams et al., 2008). According to these studies, climate change may affect habitat, the quality and quantity of water and forage available to wildlife. Impacts, such as extreme warmer or cold temperatures (Williams et al., 2008), may cause stress on wildlife, alter their welfare and consequently this may lead to extinction, unless significant adaptive capacity exists. Understanding the factors and other mechanisms influencing wildlife vulnerability (i.e. exposure and sensitivity factors) and the adaptive capacity to those impacts will allow natural resources managers, tourism practitioners, researchers and policy makers to identify and direct appropriate adaptation strategies for wildlife tourism (Williams et al., 2008).

5.2.2 Local community

The local/indigenous community is a very important component of the NCA's tourism system. Apart from wildlife, the majority of visitors are attracted by the culture and lifestyle of the local community. Their large herds of cattle, goats and sheep, accompanied by a few donkeys, together with their harmonious co-existence with wild animals present an important element of tourism that offer a unique and memorable experience for some visitors (Melita & Mendlinger, 2011). Empirical studies have

shown that 65.5% of international visitors who visited NCA during 2010 (high season) were interested in cultural activities and lifestyles of Maasai (Melita & Mendlinger, 2011, 2013).

Despite the NCA local community being an important component of NCA wildlife tourism system, climate change may have significant impacts on the livelihoods of the community. This in turn may cause the local community to become vulnerable to climate change. The vulnerability of local community may affect the patterns with which they use natural resources and impact negatively wildlife tourism. However, there are limited studies examining the community-natural resources-wildlife tourism in PAs. The implication is that local community's relationships with wildlife tourism with respect to climate change studies have received insignificant attention. Excluding local communities in climate change studies can cause difficult in implementing adaptation strategies for tourism in PAs. This thesis attempts to bridge this gap by understanding how vulnerability of local community occurs, and how this may affect people's relationships with wildlife and habitat wildlife tourism.

5.2.3 Tourism businesses

The literature has shown that tourism businesses are an important component of a tourism system. Therefore including them in this study is important. These are basically the providers of tourists' basic services. They include: accommodation providers (including food and beverages); transporters/tour guides; and souvenir and handcraft sellers. To narrow the scope, this study only involved accommodation and transport providers.

Accommodation providers include hotels/lodges and campsites. There are hotel/lodges located within the NCA boundaries and those found outside the area, mainly at Karatu town (located about 30 kilometres from NCAA head office). Within NCA there are five lodges/hotels including Serena Hotel, Ngorongoro Crater Lodge, Wildlife Safari Lodge, Rhino Lodge and Sopa Lodge (See Figure 5-3). Most have a five-star rating. In NCA a substantial number of tourists spend their nights in campsites. Many tourists prefer camping in places which reflect a real jungle life. Therefore almost all of the campsites

are constructed within NCA. Both lodges and campsites use resources, such as water, which depends on a well-functioning ecosystem.

Local transport providers (also known as tour guides in NCA) form another important component of the NCA wildlife tourism system. These providers are involved in making bookings for tourists and preparing their itineraries; receiving tourists at the airport and transporting them from the airports to the hotels/lodges or campsites and back to the airports when tourists complete their safaris. They are also involved in guiding tourists within the sites and interpretation. As highlighted in the literature review, climate change has the potential to alter ecosystem integrity and this may affect the viability of tourism businesses. These businesses have to adapt or at least increase their preparedness in order to avoid the impacts of climate change. Understanding the ways in which tourism businesses may become vulnerable and resilient to climate change is important for proposing adaptation strategies appropriate for them.

5.2.4 Tourists

Without tourists there is no tourism. There are two categories of tourists coming to NCA: domestic and international tourists (Melita & Mendlinger, 2011; Melita & Mendlinger, 2013). The former category usually comprises visitors from Tanzania while the latter comprises overseas tourists. Figure 5-3 presents visitor flow trends to NCA from 1996 to 2010. In respect of income generation, international visitors generate more income compared to domestic tourists (see Figure 5-4). The enormous difference between incomes generated from international and domestic visitors, compared roughly to the number of visitors in recent years can be an important consideration to understand behaviour of these two categories when responding to climate change issues. Similarly, the contribution of more income from international visitors compared to domestic visitors suggests that there is over-reliance on international visitors in terms of income generation. This can have significant implication for the sustainability of NCA tourism system if things like mitigation policies and economic downturns impact international visitors. Thus it is important to consider this aspect when designing strategies to increase the adaptive capacity of NCA wildlife tourism system.

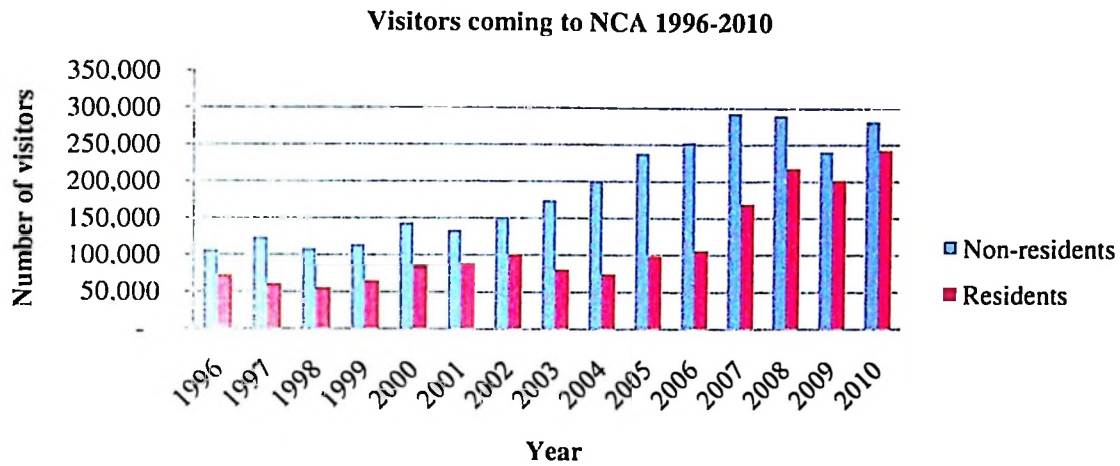


Figure 5-3: Domestic and International Visitors to NCA 1996-2010

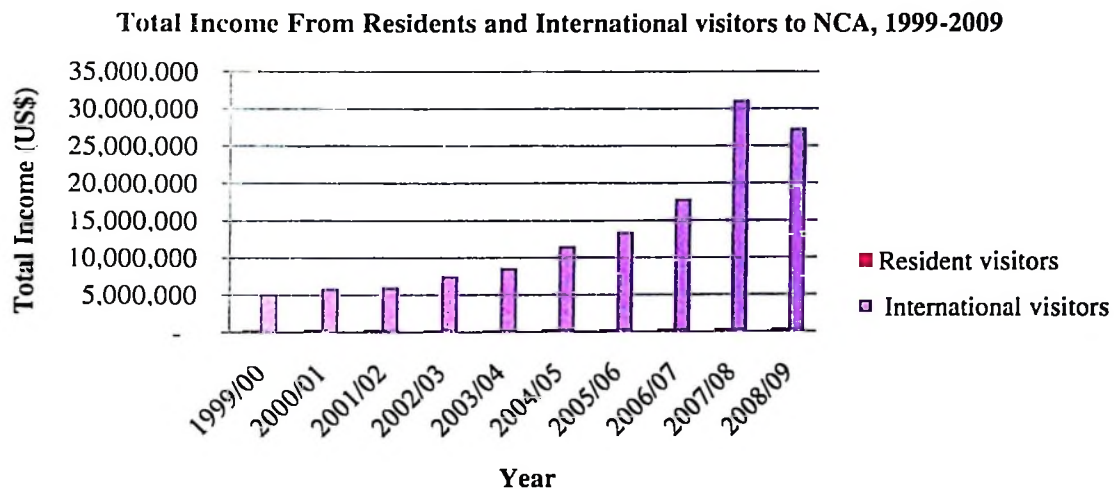


Figure 5-4: Revenue generation from domestic and International visitors

The type of activities which tourists engage in when touring a destination is an important element of vulnerability and adaptation to climate change (Jopp et al., 2010). When touring NCA, visitors engage in various activities. A large number (almost all) of visitors engage in taking photos of wildlife and associated activities. This cohort has been referred to as ‘passive tourists’ (Melita & Mendlinger, 2011). There is a growing category of younger age tourists who want a more active and learning experiential vacation (Melita & Mendlinger, 2011). These tourists want to get out of their cars and take shorter or longer hikes (one to two hours) to experience all aspects of nature with the possibility of touching, smelling, and if possible, feeding wildlife. Some visitors

belonging to this category engage also in learning local cultures, wildlife and habitat, destination history, archaeology and geology (Melita & Mendlinger, 2011). Climate change may affect some or all of these activities and consequently this may affect tourist flow.

Tourists prefer the most convenient infrastructures to ensure comfort and utilisation of minimum time during safari tour (Higginbottom, 2004). Improved roads, for instance, encourages tourists to comfortably drive through and complete their trips in shorter times, thereby avoiding high accommodation costs in NCA. Less developed infrastructures can discourage tourists from spending more than one night on site (Melita & Mendlinger, 2011, 2013). It is well acknowledged in the literature (Gössling et al., 2006) that climate change may affect the destination's infrastructure and consequently affect tourists' comfort and time.

As the literature highlighted, tourists are considered as also being vulnerable to the impacts of climate change mitigation policies. However, the literature has shown that mitigation policies will have little impact on most international tourists because tourists consider their freedom to travel as a prerequisite (Becken, 2007; Gössling et al., 2006). This implies that for international tourists, other issues such as travelling costs are not considered as limiting factors for travelling. Given this fact, it can be argued that loss of wildlife and habitat will be the major limiting factor for international tourists. This suggests the need to put more effort into preventing wildlife resources from perishing due to climate change and other compounding factors. Following the explanation of NCA tourism system, the following section presents the shocks and stressors that have affected the NCA tourism system in the past 25 years.

5.3 Shocks and stressors

As highlighted in the literature review, the terms 'shocks' and 'stressors' were adopted and will be used throughout this section. In wildlife tourism, however, little is known about shocks and stressors including the mechanisms within which they occur. The major requirement of this study is to identify, analyse and discuss their relationships with destination's exposure, sensitivity and adaptive capacity. This section discusses the identified shocks and stressors. The discussion also involves the identification of those who are affected.

Shocks are rapid, unanticipated events that can deter tourism in the short term (Jiang et al., 2012; Klint, Jiang et al., 2012; Turner et al., 2003). Shocks are considered to be low probability events believed to have severe impacts on tourism (Gössling et al., 2009). Stressors are slow onset events or processes that are a manifestation of human-environment interaction and they can affect the growth of tourism in the long run (Calgaro, 2011; Jiang et al., 2012; Klint, Jiang et al., 2012). Shocks and stressors can take place simultaneously forcing communities, businesses and households to make short- or long-term adjustments in order to achieve the optimal use of resources available to them and achieve resilience (Calgaro, 2011). Understanding how local community, wildlife and businesses make these adjustments is a matter of concern for developing a climate change adaptation framework for wildlife tourism.

The literature has strongly emphasised that the assessment of destination vulnerability should include analysis of both shocks and stressors (Calgaro, 2011; Calgaro et al., 2013a, 2013b; Jiang et al., 2012; Klint et al., 2012). Adopting Calgaro's (2011) Destination Sustainability Framework (DSF), the identification and analysis of shocks and stressors is an initial part of vulnerability assessment.

The discussion of shocks and stressors presented in this section involves mainly field data. However, the discussion is supported by scientific evidence from other researchers and stakeholders as presented in various reports and articles. The discussion presented here combines not only shocks and stressors directly related to climate change but also those that are indirectly related, and have the potential to exacerbate the impacts of climate change. The discussion involves identifying the 'who' and 'what' in the system facing the consequences of shocks and stressors.

As presented in table 5-2, there are four shocks and six stressors that were mentioned by research participants during FGDs and interviews. Key shocks include: political instabilities and crimes in neighbouring countries and global terrorism; and disease outbreaks including Rift Valley Fever (RVF) and Swine Flu (SF) and severe and recurrent droughts. Key stressors mentioned by many participants include: water shortages; biodiversity and habitat loss; recurrent human, livestock and wildlife diseases; changes in vegetation; and invasion of exotic plant species. Across the wildlife

tourism system, shocks were only mentioned by accommodation and transport providers, while stressors related to droughts, were mentioned by local community. However, stressors related to environmental degradation; invasion of species; biodiversity and habitat loss; and changes in vegetation were mentioned by park managers and ecologists. The stressors related to water shortages and recurrent human, livestock and wildlife diseases were mentioned by participants from the local community and conservation managers (i.e. park managers). The local community members were more concerned about human and livestock diseases, while conservationists were concerned about wildlife diseases and tourism businesses (accommodation & transport) were more concerned about disease outbreaks (SF & RVF) which seemed to impact their businesses. The following sections provide a discussion of identified shocks and stressors. However, prior to the assessment of shocks and stressors, determination of participants' perceptions towards temperature and rainfall changes in NCA was conducted. This assessment implies that the discussion of shocks and stressors also includes a discussion of temperature and rainfall changes as perceived by participants in this research (See Table 5-3).

Table 5-2 Examples of shocks and stressors

Key shocks & Stressors	
Some illustrative examples	
1. Key shocks:	
Political unrest and global terrorism;	<p>'The terrorist attack of 1998 that involved the American Embassy in Dar es Salaam and Nairobi affected our hotel business because of cancellation by international tourists.'</p> <p>'Bombing in Mombasa and Dar es Salaam coincided with the high tourism season'</p> <p>'The September 11 event in America reduced the number of tourists, especially those coming from America'.</p> <p>'... Post-election violence of 2007 in Kenya reduced the number of tourists coming through Kenya but not those coming through South Africa and Zanzibar'.</p>
Disease outbreaks.	<p>Diseases that affected tourism directly:</p> <p>'Swine flu that affected Kenya and Northern Tanzania affected tourism where cancellations were experienced following media coverage'.</p> <p>'Swine flu pandemic decreased the number of tourists'</p> <p>'Media coverage escalates the diseases ... it takes a couple of months to recover depending on media coverage.'</p>
Weather extremes;	<p>'Drought is making Ngorongoro [an] unlivable place, a place of no hopes'. 'Our livestock are continuously dying every year because of droughts'. 'Recent drought killed almost more than half of livestock in Ngorongoro' (indigenous people).</p> <p>'This year the drought here has invoked bitter memories of 2005/06 when the livestock keepers lost thousands of livestock and it is hard to recover when livestock are hit by drought'. 'It is not surprising to find a household losing all its cattle and goats due to drought' (indigenous). 'It is not surprising to see a family losing more than ten cattle in one season of severe drought'. 'Even wild animals and plants in crater will likely die because of drought....even with wildlife, there will be no food and water in crater lakes and ponds will end up drying' ... animals like hippopotamus will suffer the most – they will perish'. 'There will be no tourism because all animals will die if drought continues to persist'. 'Continuing deaths of livestock [in NCA] due to droughts is not only a threat to our lives but also the wildlife and tourism'. 'Droughts kill livestock and forces the energetic men and youths to migrate to town and other parts of the country to look for employment because livestock can no longer support them'.</p> <p>'Droughts causes malnutrition as there is no food around us to eat'</p>
2. Key stressors:	
Weather extremes;	<p>'Drought is making Ngorongoro [an] unlivable place, a place of no hopes'. 'Our livestock are continuously dying every year because of droughts'. 'Recent drought killed almost more than half of livestock in Ngorongoro' (indigenous people).</p> <p>'This year the drought here has invoked bitter memories of 2005/06 when the livestock keepers lost thousands of livestock and it is hard to recover when livestock are hit by drought'. 'It is not surprising to find a household losing all its cattle and goats due to drought' (indigenous). 'It is not surprising to see a family losing more than ten cattle in one season of severe drought'. 'Even wild animals and plants in crater will likely die because of drought....even with wildlife, there will be no food and water in crater lakes and ponds will end up drying' ... animals like hippopotamus will suffer the most – they will perish'. 'There will be no tourism because all animals will die if drought continues to persist'. 'Continuing deaths of livestock [in NCA] due to droughts is not only a threat to our lives but also the wildlife and tourism'. 'Droughts kill livestock and forces the energetic men and youths to migrate to town and other parts of the country to look for employment because livestock can no longer support them'.</p>

Water shortage;	<p>'Droughts causes malnutrition as there is no food around us to eat'</p> <p>'Increased tourism development (referring to increased tourist facilities such as lodges/hotels) in the area (the interviewee was referring to the NCA) and for domestic purposes has definitely increased water usage in the area...., if this trend grows unchecked, it will threaten wildlife as well as local community' (conservationist).</p> <p>'... we have no access to clean water...as you can see our kids are very dirty; they haven't taken baths for quite a long time; they dress [in] dirty clothes... do you think we like this situation? ... we don't have access to water... even tourists will not feel good to visit us [in this situation]' (local community).</p> <p>'Low rainfall and the recurrent droughts may lead to water shortages in the crater and other parts of NCA and this will affect tourism' (conservationists, indigenous community).</p> <p>'Water supply [for human consumption] is a grave concern [in Ngorongoro] for indigenous people' (local community).</p>
Environmental degradation;	<p>'Environmental degradation is an issue that needs extra efforts to address'.</p> <p>'In certain circumstances tour guides drive off the recommended roads, especially when they want to spot a rare animal for their tourists to view it' (conservationist). 'When a rare animal or its activity [perceived to be rare] is spotted, the drivers/tour guides use radio calls to draw the attention of other drivers. Many cars will move and gather on the incidence [close to the animal] for the tourists to view it ... I am not happy with the use of radio calls because they increase the chance of environmental degradation ... the use of radio calls needs to be prohibited' (tour guide/driver). 'Forest destruction used to be a serious issue especially in the eastern part of the 'Northern Highland Forest'. 'Forest destruction threatens the water catchment'.</p>
Biodiversity and habitat loss;	<p>'Some animal species such as [rhino and wild dogs] are at risk of extinction'. 'We have experienced a declining trend of wildebeests, hyena and lions'. 'There are many factors causing decline of these animals'. 'Inbreeding, inadequate prey due to decline in wildebeests and changes in vegetation, may be due to climate change.'</p>
Change in vegetation structure;	<p>'There is notable change in vegetation – probably due to climate change'.</p> <p>'Lerai forest [in the crater] is one of the [important] habitats at risk of loss due to disappearance of acacia trees'.</p> <p>'Lerai forest provides homes for elephant refugees in the crater.'</p> <p>'If withdrawal of water in Lerai ponds continues unchecked, habitat for hippopotamus may disappear'.</p> <p>'Yeah! Signs of climate change are clear. We can see how vegetation has changed'.</p> <p>'We have noted the invasion of a new weed called <i>Datura stramonita</i>'. 'Invasive long grass species in short grassland is obvious'.</p>
Recurring human, livestock and wildlife diseases.	<p>Recurring livestock and wildlife diseases (future impacts on tourism):</p> <p>'Diseases such as <i>distemper</i> and <i>pasteurella bacterium</i> are affecting the wildlife such as lions and wildebeests [respectively]'.</p> <p>'Some species of wildlife, such as wildebeests and lions, are declining due to livestock and wildlife diseases'</p> <p>'There is a possibility of other animals to be affected by diseases... but we haven't done enough research on this.'</p> <p>'Control of these diseases has shown some improvement, especially in wildebeests – a population increase has been recorded'.</p> <p>'Tourism is not currently affected by wildlife diseases, but in future if the diseases persist without proper control measures, we will end up having no wildlife and there will be no tourism at all – you know tourists are drawn by wildlife'.</p>
	<p>Recurring human diseases (indirect impacts on tourism):</p> <p>'Our children migrate to town to look for employment following a decline in livestock; upon there they acquire HIV/AIDS and malaria.'</p> <p>'The most common diseases here are malaria and HIV/AIDS' (local community).</p> <p>'We cannot participate effectively in cultural tourism activities when we are sick'.</p> <p>'The labour force required to graze livestock is declining because of diseases and migration to town' (local community).</p>

Table 5-3: Some illustrative answers about perceptions of participants on temperature and rainfall

Parameter	Some illustrative responses
Temperature	<p>‘In past time you couldn’t find me dressing like this...’</p> <p>‘Over here, life has changed ... temperature has slightly increased ...’</p> <p>‘The cold of previous period used to be heavier indeed than today’s...’</p>
Precipitation	<p>‘...rainfall here is ever decreasing...’</p> <p>‘during this period (the interviewees were referring to January through February, 2010, January through March, 2011) Ngorongoro used to be evergreen because of rain, but as you can see it is dry everywhere due to lack of rainfall’</p> <p>‘Nowadays rainfall is delaying; even the animals (he was referring to wild animals) are delaying to return from Serengeti National Park’ (tour guides and indigenous community).</p> <p>‘During this period you could see big herds of animals in [Ngorongoro] crater..., yeah, thousands of them..., but because the rainfall has delayed, the animals are yet to return’ (tour guide).</p> <p>‘Low rainfall and the recurrent droughts may lead to water shortages in the crater and other parts of [the] NCA’ (conservationists).</p>

5.3.1 Shocks

Political unrest and global terrorism

The issue of tourism vulnerability in the context of political unrest and global terrorism has received significant attention from some researchers (Sönmez, 1998; Sönmez & Graefe, 1998). A few researchers, however, have worked to link these events with climate change in Africa (Buhaug, Gleditsch, & Theisen, 2010; Hendrix & Glaser, 2007; Raleigh, 2010; Raleigh & Urdal, 2007). Political unrest, global terrorism and other crime including insurgencies, genocide, guerrilla attacks and gang warfare are non-climatic shocks, but researchers have shown their linkage with climate change (Buhaug et al., 2010; Homer-Dixon, 2007). In particular, increasing crime rates have been linked with resource scarcity and poverty, which in turn are all linked with climate change (Raleigh, 2010; Raleigh & Urdal, 2007; Yanda & Bronkhorst, 2011). Weather variability associated with temperature, precipitation and drought anomalies are the principal drivers of resource scarcity in most East African countries (Hendrix & Glaser, 2007; Raleigh, 2010; Raleigh & Urdal, 2007).

Political unrest involving civil disobedience and kidnapping of international tourists in Kenya plus global terrorist acts which took the form of bombings in Tanzania, Kenya and the United States of America (USA) were the major shocks mentioned by

accommodation and transport providers. According to participants, most of these events occurred outside Tanzania's boundaries but their impacts were felt by tourism businesses in NCA. In support of this fact some of the interviewees said:

'Normally, the impacts [caused by political unrest in neighbouring country; global terrorism and or disease outbreaks] tend to affect a destination that is close to where they have occurred' - (Tour guide and hotel employee).

Most participants from accommodation and transport sectors mentioned specific events including: the post-election civil violence of 2007-8 in Kenya; frequent kidnapping of western tourists in Kenya; bombing of US embassies in Dar es Salaam; Tanzania and Nairobi, Kenya, which occurred on August 7, 1998; the September 11, 2001 event, which involved bombing of the World Trade Center (WTC) in USA; and the bombing of the Paradise Hotel in Mombasa, Kenya, which occurred on November 28, 2002 as one of the most devastating events. Reduction of visitations and loss of revenues as a result of these events were mentioned as the major primary impacts. According to the interview and participants, these events affected tourism in NCA because most of them occurred during high tourism season. As some of the respondents from hotels and tour operators said:

'For sure these events reduced the flow of [international] tourists who come to the NCA though they didn't last longer. The events resulted in some cancellations and no new bookings' (Lodge staff).

'Normally these events when they occur they can come in a heavy blow but they normally last shortly, ... it can take about a month or so to recover' (Tour guide).

Post-election civil violence in Kenya occurred in 2007 was mentioned during interviews as being one of the major causes for reduced tourist flow to NCA. Some researchers have acknowledged that the consequences of climate change (such as crop and livestock failure) are some of the major contributing factors to most political conflicts occurring in Africa, particularly in the Sub-Saharan and Horn of Africa regions (Hendrix & Glaser, 2007; Meir & Bond, 2007). The political violence occurring frequently in Kenya has been associated with severe droughts in the northern parts of Kenya and scarcity of arable land for agriculture in most parts of the country. In East Africa, these conflicts affect tourism more severely than other economic sectors. This is due to the fact that in

the 1990s and 2000s international tourists have been among the targets of these conflicts (Gössling et al., 2006, 2009). For example, Kenya experienced a drop in hotel occupancy rates in 1998 of 24% from 58% in 1997, due to political instability associated with blacklisting by tour operators (Sindiga, cited in Gössling et al., 2006, 2009). As mentioned by hotel managers and tour guides, the impacts of these events on Kenya's tourism were also felt in NCA because some international tourists tend to come to NCA via Kenya.

'You know many international tourists especially those coming from the United Kingdom, come to Ngorongoro via Kenya, therefore any event that threaten tourists in Kenya would be a threat to [tourism in] NCA'.

It is important to note that because NCA and the SNP in Tanzania and the MMNR in Kenya share the ecosystem, international tourists frequently cross the border to explore wildlife adventures in both countries during one visit (Swanson, 2007). This is particularly due to the strong desire by international tourists to enjoy and gain knowledge of different wildlife adventures (including migration, predation, breeding and feeding patterns) offered by wildlife migrating from NCA to Masai Mara and vice versa. This desire can only be fulfilled by crossing the border between Tanzania and Kenya. As such, any event that could potentially threaten Kenya's tourism is a threat to Tanzania's tourism, especially the northern tourism circuit (NTC).

Kidnapping of western tourists in Kenya is another form of crime that was said to have interrupted tourism business in NCA. Such kidnapping in Kenya also featured in headlines of various local and international media during 2011 and 2012. Like the political chaos in the country, these kidnapping events were also said to have impacted tourism in Ngorongoro. Nevertheless, interviewees perceived that media have contributed to the issue and these events have escalated. With regard to this kind of terrorism, another hotel employee made the following statement during the interview:

'Warning of the kidnapping events [occurred] in Kenya might have contributed to the reduction of [international] tourists coming to our hotels. You know, most [of our visitors] are package tours who wish to explore [the] attractions from both Kenya and Tanzania in a single journey... when there is any media warning in any of these countries, they don't come'.

The link between crime and climate change also featured during the interviews. Some of the interviewees in this research linked crimes in Kenya with ethnic conflicts occurring frequently in Northern Kenya and Somalia, followed by poverty caused by a failure of crops and livestock as a result of climate change. They associated these groups with crimes such as piracy in the Indian Ocean and the kidnapping and killing of western tourists in northern parts of Kenya. According to the interviewees, these crimes are likely to contribute to a decline in tourists coming to NCA and East Africa, in general, particularly those who wish to come via Kenya.

‘Tourism in NCA can face difficult moments especially in this period where there are so many events of violence in Kenya. We have heard [from the media] that Somali gangs are involved in kidnapping tourists in Kenya. You know, about half of our international tourists come via Namanga border from Kenya. Let’s hope if these violence continue they [tourist] will not come via Kenya, rather, they will come directly when they plan for their journey – it will be a blessing to us’ (Manager from SO lodges).

For decades Somalia has endured conflicts which are said to have been aggravated by extreme weather (severe droughts), scarce resources and poverty among its communities (Parry et al., 2010). Due to these conflicts, even multinationals have tended to issue warning announcements to ensure that travellers take precaution or avoid all/unnecessary travel to some of the East African countries. For example, Canada’s Department of Foreign Affairs has a tendency to release maps that alert tourists as to which destinations are safe or otherwise. On a map released when data collection for this study was going on, Somalia was marked as a destination to avoid visiting completely, while Kenya was marked as a destination where travellers should avoid visiting some parts (especially the northern and eastern parts). The security alert says: ‘Avoid travel to northeast Kenya within 150km of the Somali border, including coastal areas and border areas near South Sudan and Ethiopia; and avoid non-essential travel to the eastern parts of Nairobi’ (<http://www.travel.gc.ca> 28/04/2013). According to this information, Tanzania is marked as a country where visitors should exercise a high degree of security precaution, showing that it is at least safe to travel compared to other East African countries. However, tourists are believed to be averse to destinations with security risks (Gössling et al., 2006, 2008, 2009), and climate change can further exacerbate crimes in East Africa and affect visitation if necessary efforts to adapt to climate change are not taken.

The question of *who* in the NCA tourism system is affected by the above shocks has been investigated in this research. Comparisons of the effect of these events across the NCA tourism system has shown that hotel and tour operators were more concerned with these shock events than were native residents and conservationists. Hotel lodge and tour guide operators were the only participants who mentioned the effects of political instability in neighbouring countries and terrorist attacks as major shocks. With respect to what extent terrorist attacks had affected other NCA stakeholders (native residents and conservationists); native residents seemed not to have been affected. According to the Maasai, tourism was 'business as usual'. In other words, these people were more resilient than other stakeholders.

'You know our visitors come on discretion of the tour guides ..., when a tour guide decide to bring them to the *boma*, ... he do it at his own discretion ... we have neither control over the tourists nor tour guides, for us I can say it was business as usual as there is always a raise and falls each year' (Native Maasai).

Similarly, secondary data about visitor flows recorded at NCAA during terrorist events indicates there was no decrease in international visitor numbers who visited NCA. But a slight impact was felt a few months later. For example, the data recorded by NCAA in September 2001 recorded 22,140 visitors compared to 21,748 visitors in September 2000. This is an increase of 392 (2%) visitors from the previous year. The number of visitors remained stable in October 2001 (one month after 9/11) with a slight decrease in November and December. In December 2001, three months after 9/11, there was a slight decrease in the total number of visitors to NCA, indicating a reduction in tourist flow from 54,576 in 2000 to 51,542 visitors (i.e. 6% decrease).

To gain more understanding of how terrorist attacks affected tourism, some of the NCA authorities took part in the research and offered their opinions, which appeared similar to statistical secondary data.

'Actually we haven't faced any serious effect in terms of tourism reduction due to terrorism. What I can see is only the global economic crisis of 2008–2009 that brought major impacts in tourist flow.' Tourism here involves visitors from different angles and with different perceptions regarding events' (Conservationist).

With respect to regional and global tourist flow during and after these events, another study conducted by Gössling and Hall (2006) noted the September 11, 2001 event reduced the flow of tourists by 40% to 50%, and a 30% decline in world tourism three months after the event. It can be assumed that because some international tourists who visit Kenya tend to extend their journey to NCA and Serengeti, Tanzania and vice versa, the decrease in tourism could be felt between the two countries. After the September 11, 2001 event (9/11), flying was generally perceived as risky and travel behaviour changed globally and was accompanied by the emergence of new travelling behaviour patterns (Gössling et al., 2006, p.165).

Although both hotel and tour operator interviewees seemed to have no data indicating the exact magnitude of impacts in terms of number of bookings cancelled and revenue lost, their responses indicated that impacts varied. While there were interviewees who were affected mostly by the 9/11 event, others were affected mostly by the bombings of American embassies in Dar es Salaam and Nairobi. However, when comparing transport and accommodation providers the accommodation sector appeared to be less affected than transport providers. Factors that caused some resilience among some accommodation providers include the presence of strong networks and business diversification. Variations in sensitivities are discussed more in chapter seven (the system's adaptive capacity). One interviewee was quoted as saying:

'I think the September 11 event was the worse among the event[s] that have caused damage to our business ... it reduced the flow of arrivals especially from [the] USA ... you know, [the] USA is one of our reliable markets you can think of ... [therefore] any threat to their travel is a loss to us' (Tour guide).

While some interviewees considered 9/11 as the most severe event, others considered the bombings in Dar es Salaam and Nairobi as being the worst catastrophes that impacted tourism businesses. Regardless of the fact that these events occurred at different times, the variation in impacts results from the prediction made by climate change scientists (and supported by interviewees) that businesses will be impacted differently by the same climate change event, even if they are similar because of differences in vulnerability and resilience. Other interviewees said:

'... I don't know about other business[es], but for us - (the hotel name is withheld) - the terrorist events involved [the] American (USA) Embassies in Dar es Salaam and Nairobi reduced the number of [international] tourists and, of course, the revenue [from them] ... [this] resulted in temporary staff relocations and redundancies ...' (Hotel manager).

Others felt that both events had equally impacted tourism in the NCA:

'All that I know is that all these events have affected us...'

In summary, the shock related to political instability and terrorism can be aggravated by climate change. In Tanzania, individual businesses, especially accommodation and transport, were affected by the consequences of these events compared to other stakeholders in the system. Among them some were less affected than others. However, it is important to note that according to the participants from affected sectors, the impacts of these shock events did not last for long and recovery was swift.

Disease outbreaks

As presented in table 5-2, Rift Valley Fever (RVF) and Swine Flu (SF) outbreaks were identified during interviews as among the major shocks that have affected tourism in NCA. Respondents reported that the recent, most severe RVF outbreaks occurring in 2007-2008 affected wildlife tourism in both Kenya and Tanzania. These events are also reported in Rich & Wanyoike, (2010). The other outbreak mentioned by respondents occurred in 1997-1998, mostly affecting tourism in Kenya, but its impacts spread to Tanzania. The outbreak of SF in 2009 was highlighted by respondents as another incident that affected tourism in NCA. This was further supported by Tanzania's media and various government reports. For example, the number of international tourists travelling to Ngorongoro declined from 641,951 in 2008 to 576,643 tourists (approximately 10%) in 2009, mainly due to SF and the global economic downturn (*The Guardian*, 2011; *The East African Newspaper*, 2011; URT, 2010).

Scientists have stressed that many infectious diseases in the developing world have disappeared or at least remained dormant for a long time but others have emerged due to various factors including climate change (Baylis & Risley, 2013). While RVF is believed to have been prevalent in East Africa since 1930 (Woods et al., 2002), participants of this research believe that the deadly SF is a new disease in East Africa.

The media in East Africa reported that by the end of 2009, about 191 cases of SF were confirmed in Kenya and its impacts were felt across various economic sectors (including tourism) and countries in the region.

There is a close relationship between the occurrence of RVF and SF viruses and local climate variability. 'Certain diseases are associated with particular environmental conditions, seasons and climate' (Baylis & Risley, 2013). This is because some of these viruses are transmitted by vectors (mosquitoes, ticks, fleas) which are sensitive to local climate change and seasonal variability (Baylis & Risley, 2013; Mandell & Flick, 2010; Martin et al., 2008). Other researchers suggest that the persistence of a new disease in a new environment indicates that climate change has occurred in that environment. RVF and SF are among such diseases (Baylis & Risley, 2013). The scientists further acknowledge that variation in local weather parameters (precipitation, temperatures and humidity) can influence the distribution and abundance of vectors responsible for transmission of these diseases (Baylis & Risley, 2013).

A certain range of a local weather parameter is required to induce new patterns of transmission and consequently the abundance of these vectors in a localized environment (Baylis & Risley, 2013). In East Africa, RVF outbreak is associated with extreme precipitation and floods (Baylis & Risley, 2013; Martin et al., 2008). Heavy precipitation will flood an area causing the dormant eggs of the *Aedes* mosquito vector to hatch in large numbers resulting in rapid spreading of the vector (Baylis & Risley, 2013; Martin et al., 2008). Through the aid of heavy rainfall and flooding, these vectors can spread and occupy a large area within a short time. Although NCA is currently faced with droughts and low rainfall, it also experiences occasional unusual precipitation which results in flooding. Furthermore, as the IPCC (2007a) has predicted, East Africa is likely to face extreme weather including extreme precipitation. This implies that even if NCA is characterised by low and erratic rainfall, increased precipitation in other parts of East Africa (such as Kenya) can cause an RVF spillover to NCA as can be transmitted through other mediums (e.g. human beings or migrating wild animals). A tour guide in Ngorongoro said:

'When a disease outbreak occur[s] in one country or one region, it just takes a few weeks or so for the disease to cross the borders, particularly if

the outbreak happen in a region that is in close proximity to your destination.'

Despite the fact that in East Africa the livestock sector is the one that is most hard hit by RVF (Rich & Wanyoike, 2010); indirectly this disease, and other infectious diseases, affects wildlife tourism. There are various ways in which these diseases can affect wildlife tourism: (1) impacts travelling patterns because travellers are averse to high risk health areas (Gössling et al., 2009; IPCC, 2007a; Simpson et al., 2008) and according to respondents, this contributed to the immediate decrease in travellers coming to NCA; (2) impacts livestock which, in NCA, is a source of attraction for cultural tourism and the associated tourism supply chain (meat supply in some hotels and restaurants); and (3) impacts wildlife (which attract tourism) and the livelihoods of local people who play an important role in delivering tourist services.

However, interviewees indicated that sometimes the impact of these diseases becomes severe on tourism businesses because of media exaggeration. For example, in this research, interviewees reported that RVF and SF outbreaks affected travel patterns, especially the northern circuit of Tanzania, where cancellations and no new bookings in hotels were experienced following escalation by the media. Both hoteliers in NCA and tour guides were concerned about this effect:

'Although, media coverage and travel alert websites help to increase awareness of tourists of the infected areas, there is a possibility of over-publicising it even where the destination experts are able to contain it' (Tour guide).

'We receive few or no new bookings from international tourists when there are media alerts' - (Hotel employee).

This is supported by the facts put forward by Mandell and Flick (2010) that due to the deadly nature of RVF and SF, any event that would involve an introduction or outbreak of viruses in a given locality would receive more media attention from western countries which sensationalise these events worldwide, causing people to panic and consequently this affects their patterns of travel. Media coverage can also exacerbate the impacts of climate change (Klint et al., 2012).

Increased frequency and severity of droughts

It is predicted by climate change scientists that increased frequency, duration and severity of droughts constitute climate extremes that will have negative impacts on various sectors of the economy including overlapping sectors such as agriculture, livestock production and tourism (Ding, Hayes, & Widhalm, 2011; IPCC, 2007a; Mishra & Singh, 2010). Drought can occur in all climatic zones and this will have direct social, environmental and economic consequences (Ding et al., 2011; Mishra & Singh, 2010). Despite the fact that drought is recognised as a potential threat to various economic sectors the consequences have not been fully explored (Ding et al., 2011; Mishra & Singh, 2010). To date little research has been carried out to assess the effect of drought on tourism.

Severe drought will manifest as a combined adverse outcome on the wellbeing of individuals, communities, businesses and ecosystems (Ding et al., 2011; IPCC, 2007a; Mishra & Singh, 2010). Virtually, these outcomes are not clearly addressed in the tourism sector and this underlies the need for reassessment. The consequences of drought are of primary importance for planning current and future adaptation strategies (Mishra & Singh, 2010). This requires an understanding of historical changes as well as the impacts of droughts in the destination during their occurrence (Mishra & Singh, 2010). This subsection presents the findings from the assessment of perceived changes (both immediate and future) and the effects of drought on wildlife tourism in NCA.

Weather extremes involving unusual increases in drought and severity was discussed by various participants as important stressors that put more pressure on the development of wildlife tourism in NCA. According to interviewees the occurrence of droughts in NCA is not a new thing. However, the severity, frequency and duration of droughts have increased especially in the recent 2000s. This was particularly the case in 2006, 2007, 2009, 2011 and 2012. It became clear from almost all local community members, conservationists, and accommodation and transport providers interviewed that in Ngorongoro, drought is increasingly becoming a serious problem, affecting mainly the wellbeing of native residents and their livestock.

According to participants, since 2009 severe droughts have significantly affected people's livelihoods in NCA. The data collected from NCAA (which were also available to the villagers) revealed that drought occurred between July and September 2009, claiming the lives of 89,688 goats, 87,000 cattle and 86,032 sheep (see table 5-4) and that both young and adult female livestock are mostly affected. During severe drought about 33% to 35% of calves that are born die in NCA (*The Citizen*, 2011).

About 100% of the local community members are engaged in livestock production and they depend on this industry as their major means of livelihood (NCAA, 2010). Livestock deaths pose greater implications for community wellbeing and increase vulnerability of the people to disease because it results into poor feeding and malnutrition. For many years, complications such as starvation and death of livestock have been caused by severe droughts in Ngorongoro, according to participants. But towards the end of 2012, the extent of drought went further, claiming the lives of children of native Maasai due to disease and malnutrition. It is estimated that more than 200 children died in 2012 and many adults also suffered starvation as a result of drought issues (*The Citizen*, 2013).

Deaths of livestock affect the participation of the local community in tourism activities. A considerable population of Maasai is also engaged in tourism as an alternative livelihood option to supplement dwindling income from livestock. Maasai participate in tourism in various ways such as dancing before tourists, accompanying tourists in walking safaris (trekking), and educating tourists in relation to Maasai culture. Furthermore, Maasai are engaged in making and selling handcrafts. It is important to note that NCA was accorded the status of an 'Eighth World Wonder' and an 'International Biosphere Reserve' because of the coexistence between Maasai, livestock and wild animals in the same ecosystem (NCAA, 2010). In this aspect, the Maasai people and their livestock become important tourist attractions. While some tourists are interested in learning about Maasai culture, others want to see livestock herding with wild animals. Although cultural tourism is not fully developed to guarantee Maasai an income sufficient to offset dwindling livestock, the impact of severe drought on their wellbeing threatens the wellbeing of Maasai and deters their effective participation in tourism activities. This further increases their vulnerability to drought and associated stressors. Deterred livestock production due to severe drought not only reduces the

economic base for Maasai livelihood but also reduces the resource base for cultural tourism. It affects the capacity of Maasai to participate in tourism activities. As a result, the poor participation of Maasai in tourism provides an opportunity for non-Maasai community outside NCA to pose as Maasai and take cultural tourism business. Moreover, poor health reduces Maasai attendance to school. Educated Maasai could be involved in tourism as interpreters, tour guides or employees in tourism businesses.

Local community noted that severity of droughts is exacerbated by lack of rainfall. They perceive that the intensity and duration of rainfall, in both long and short rainfall seasons, have decreased since the 1990s compared to previous decades. This perception tallies with the analysis of rainfall trends in NCA, taken from station headquarters. Moreover, reduced rainfall intensity and duration affects the amount of water entering the soil and results in negative impacts on pasture growth. Low moisture content in the soil reduces the capacity of pastures to withstand drought and consequently affects the availability of food for livestock.

Furthermore, informal discussions with NCA conservationists have shown that severe droughts may have a profound effect on crater wildlife. Wildlife receives significant conservation priority and their propensity to migrate from affected to unaffected ecosystems means their resilience to droughts, compared to native residents, is increased. However, if wildlife is or will be impacted severely by drought, the potential for the future development of wildlife tourism will be compromised and at considerable risk. Figures 5-5 and 5-6 shows how the crater appears during wet and dry season.

Native residents who participated in this study indicated that years of severe drought has also been linked to water shortages, particularly, for both livestock and domestic users. Water shortages are linked to perceived reduced rainfall. One respondent said: *'drought is worse this year because of insufficient rains from the last season'*. Analysis of water shortages in NCA is presented in the following subsection.

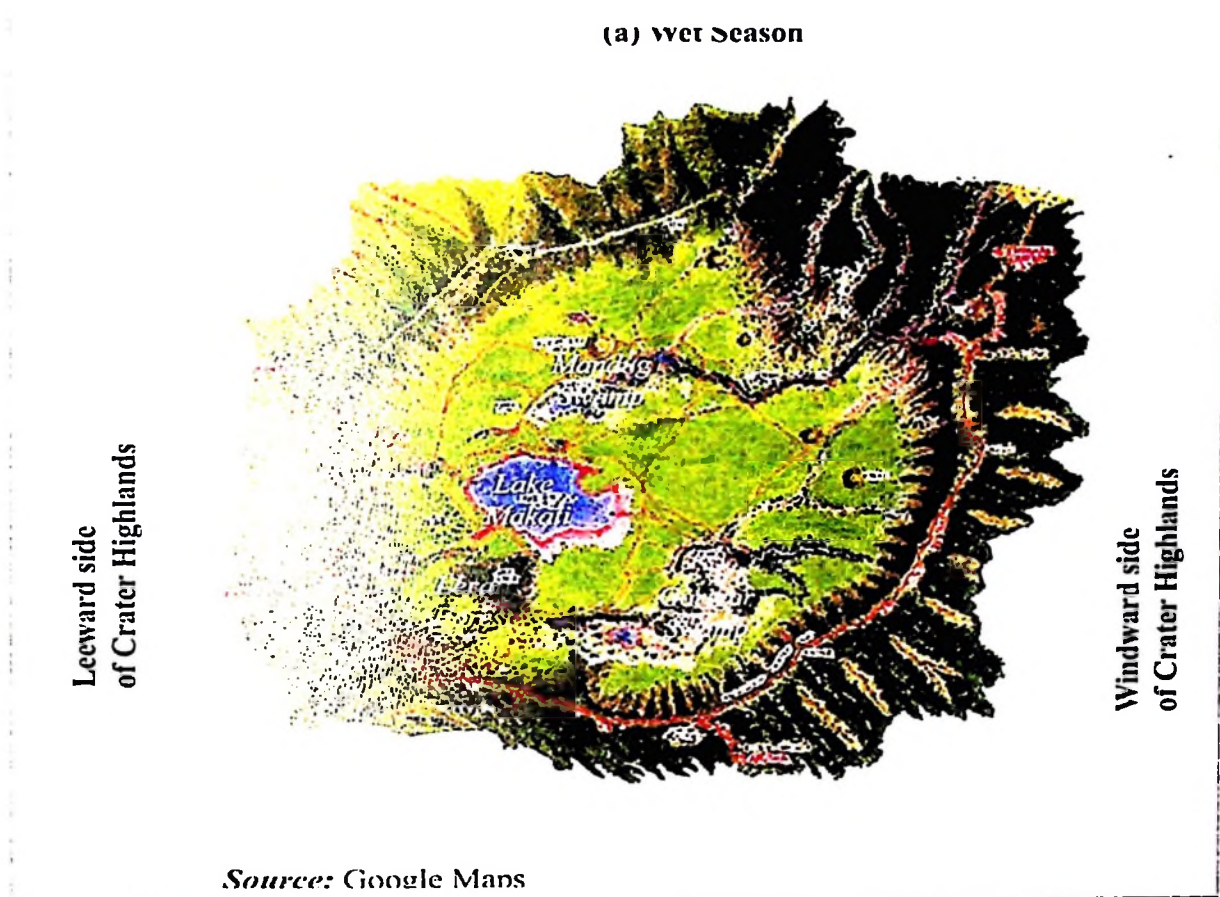


Figure 5-5: The Ngorongoro crater during wet season

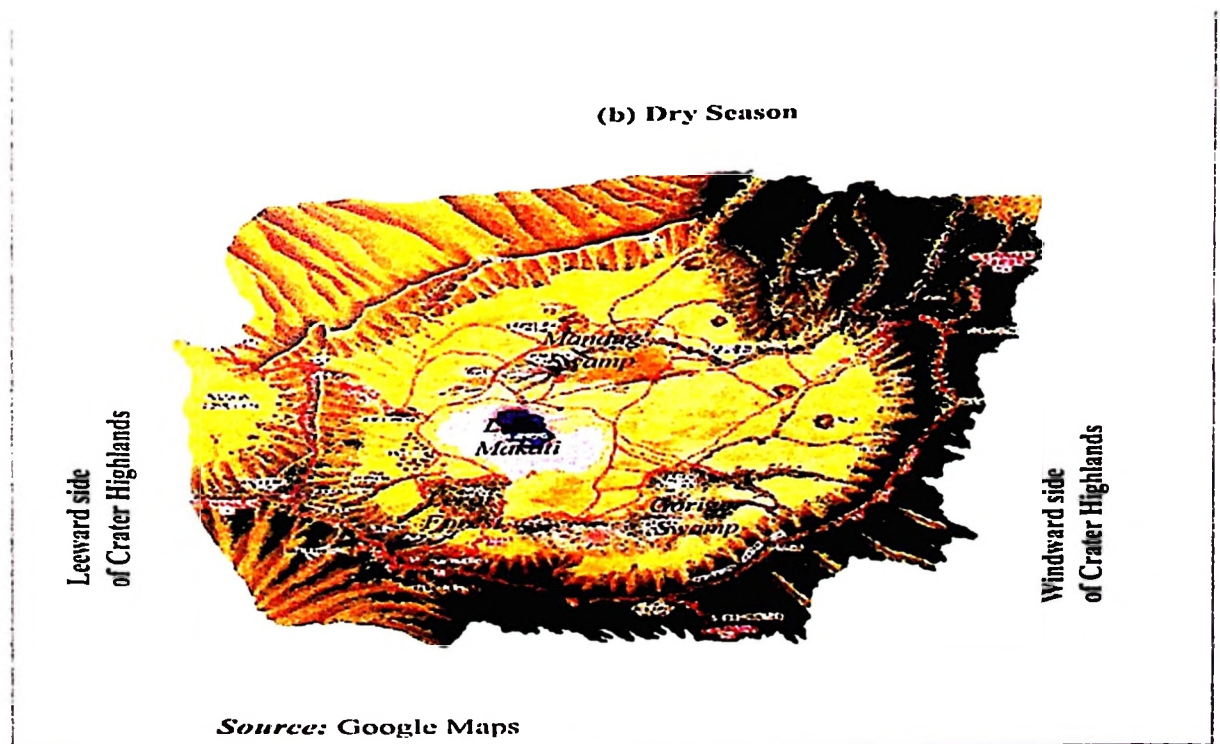


Figure 5- 6: The Ngorongoro crater during dry season

5.3.2 Stressors

Stressors constitute another category of factors that trigger vulnerability of a destination to climate change. As discussed in chapter two, stressors include slow onset events that can be observed over a longer time scale. As shown in table 5-2, various stressors were identified during field data collection as well as from secondary sources (reports and published journal articles). The identified stressors include: water shortages, environmental degradation, biodiversity, habitat fragmentation, changes in vegetation and the invasion of exotic plant species. These stressors are discussed in more detail below.

Water shortages

Reduced water availability for human consumption (especially native residents) and for wildlife entering the crater was mentioned as another critical stressor that continues to affect NCA. The local community (particularly Maasai) mentioned that water for livestock and human consumption has decreased tremendously since the 2000s. This exerts stress on livestock, human beings and livelihoods. One villager was quoted as saying:

‘As you can see our children look dirty and shabby, we too, you wouldn’t think that we are interested in this kind of situation. There’s no water around us ... seasonal ponds that we depend [on] have dried up from drought, yeah, they dry very quickly ... and we don’t have money to purchase water elsewhere, as our livestock are gone. We have no choice but to accept the situation.’

This suggests a scarcity of water in NCA. Many such opinions were raised during the interviews with the local community members. These participants were of the view that water shortages are linked to reduced precipitation and prolonged, severe droughts that continue to hamper Ngorongoro. Tanzania’s local newspapers reported water shortages as did other print media (*The Citizen*, 2011; *The Guardian*, 2011). For example, *The Citizen* (2011) reported the issue of water shortages in Ngorongoro following an interview with local residents (Maasai). One villager was quoted as saying:

‘The drought this year has invoked bitter memories of 2005/06 when the livestock keepers in Ngorongoro lost hundreds of cattle due to lack of pasture and water, adding that water supply for human consumption was equally a grave concern.’

At the management level, water shortages caused by severe droughts was a major concern for implementation of some community development projects. The Community Development Manager with NCAA was quoted as saying:

‘The severe drought this year has hampered our efforts to implement some water projects intended to benefit livestock keepers in the NCA’.

According to NCAA staff, drought had caused many drilled waterholes to dry up and this hinders the NCA’s efforts to enhance sustainable development for local residents.

Changes in vegetation

Changes in vegetation are another slow impact stressor mentioned by NCA ecologists and other conservation experts during data collection. According to these experts, Ngorongoro is currently facing a threat of changing vegetation structure caused by invasive plant species (both native and non-native plant species). An invasive species is defined as ‘a species found, as a result of human activities, beyond its acceptable normal distribution, and that adversely affects the habitats it invades ecologically, environmentally and economically’ (Steffen et al., 2009 p. 70). Other authors have defined invasive species as those taxa that have been introduced recently, and exert substantial negative impacts on native biota, economics and human health (Hellmann et al. 2008). An NCA conservation expert explained during the interviews that currently invasive plant species are concentrated in a few patches of NCA but can spread to other areas, if unchecked. This expert acknowledged that changing vegetation structure affected by invasive plant species can have serious effects on wild animals, livestock and consequently the future growth of wildlife tourism. The expert said:

‘The invasion of exotic plant species in recent years is clearly seen [in NCA]. These may cause significant stress on the wildlife ecosystem [as well as the livestock] and they may affect the future development of tourism, if allowed to persist. The effect of climate change [on vegetation] is obvious. For those who have been living here for many years, can explain this’.

This observation was further supported by the Tanzanian print media (*The Guardian*, 2011) as well as journal articles (Estes et al., 2006). The heading ‘Strange, destructive species invade local tourist circuit’ appeared in *The Guardian* (July 17, 2011). According to this article, the spreading of invasive plant species poses a serious risk to

the ecosystem and can cause the extinction of native biodiversity including plants, wildlife and domestic species that are important resources for tourism. In July 2011, an ecologist from the Serengeti National Park (SNP) was interviewed by the media. He acknowledged that the invasion of non-native species was becoming a serious problem, and contributed to the changing vegetation structure in both SNP and NCA, with the possibility of spreading to surrounding national parks (Mikail, 2011).

Two types of invasive species were mentioned: exotic and native. These species were reported by conservation experts during data collection, by the newspapers and were published in some journal articles. The most commonly reported exotic species to have invaded NCA include the Mexicana poppy (*Argemone mexicana*) and Thorn apple (*Datura stramonia*) (Personal interview with the senior NCA conservation expert). Other species include: Prickly pear cactus (*Opuntia spp*) and Custard oil (*Ricinus communis*) (Mikail, 2011). According to the conservation expert, the Mexicana poppy (*Argemone mexicana*) is the most dangerous invasive species due to its 'double effects' on the animals (both domestic and wild). By double effects it means that the invasive species has the potential to inhibit the growth of some native grass species, thereby reducing the range land available for herbivores. And, if swallowed, it can poison and kill an animal. Native invasive species include the *Bidens schimperi* and *Earlangea spp* (Estes, 2006). These species usually grow in masses of tall, dense stands not fit for herbivores to feed on. They occupy the sizeable areas of grassland and significantly reduce the amount of palatable pastures available in the rangeland for herbivores (Estes, 2006). 'In some places the invasive *Eleusine jaegeri* can be found to dominate as it quickly occupies the affected areas' (Swanson, 2007). This species is also not palatable for herbivores and can damage the teeth of both wild and domestic grazers (Swanson, 2007).

'The spread of Mexicana poppy and *Datura stramonia* is worrying and could have terrible implications for these unique and valuable national parks' I would like to make an appeal to the relevant authorities to take action before it is too late' (Hoeck cited in Mikaili, 2011).

There are relationships between invasive species and climate change as explained in the literature (Hellmann et al., 2008; Steffen et al., 2009; Thuiller, 2007). Like other plant species, invasive species respond to climate change and may pose ecological,

environmental and economic implications (Hellman et al., 2008). Changing vegetation as a result of invasive species is one of the predicted ecological consequences of climate change for destinations. Steffen et al. (2009) reported that under climate change, the invasive species successfully displace the native species, especially if the latter is under stress from other threats including poor management regimes (e.g. overgrazing) and increased soil compaction by moving vehicles.

Climate change create suitable conditions (e.g. altered soil moisture and pH content) that enable successful invasive species to occupy the area and displace previously thriving native species by successfully competing for space, food and water (Steffen et al., 2009). For instance, during severe droughts the grasslands of Ngorongoro are depleted (Estes et al., 2006) and creates favourable sites for invasive species such as *Bidens schimperii*, *Earlangaea spp* and *Eleusine jaegeri*. These species tend to occupy the area previously occupied by the native species. After invading the area, the invasive species can persist, even during and after severe droughts, leading to permanent occupation of the infested areas until they are burnt or tramped (Estes, 2006). This consequently reduces the rangeland available for herbivores.

Climate change can also facilitate the transportation of invasive species from one locality to another (Scott, 2011). Extreme weather events, such as flooding, can enhance the dispersal of some invasive species from infested to unaffected areas. Although, this research has found that weather conditions in NCA are currently dominated by reduced precipitation in intensity, duration and frequency (according to perceptions of participants of this research) and associated severe droughts, occasional flooding was also reported. Under climate change the floods may become even more intense and thus further aid the dispersal of invasive species.

The relationship between wildlife tourism and changes in vegetation in NCA is direct and indirect. Observation indicated that vegetation structure directly impacts tourism as it can impair or facilitates viewing of wildlife and their activities. For instance, the presence of short grasses enable tourists to easily view wild animals and their activities including depredation, calving, playing and fighting. However, it was revealed during the discussion with one of the senior NCA managers that most of NCA grassland areas have been encroached by bush vegetation. The discussion continued to reveal that if the

encroachment of bush vegetation escalates it may reduce visibility of some wildlife by tourists. Changes in vegetation structure can indirectly impact wildlife tourism as it affects wildlife growth and their habitat, which in turn may lead to extinction and consequently this affects tourism. The literature has shown that the set-up (heterogeneity pattern) of vegetation in the Ngorongoro crater plays a greater role in supporting the diversity of wildlife and associated tourist activities (Estes & Atwood, 2006). Increasing encroachment of bush vegetation into grassland may lead to an increasingly reduction of range size for herbivores (such as wildebeests, zebra and gazelles) and livestock. Because bush vegetation is not suitable for feeding these animals, there is the likelihood that reduced range size has affected the feeding patterns of these animals, and this may affect their growth, reproduction and consequently may lead to their extinction. Similarly, the encroaching vegetation creates hiding places for predators. All these changes mostly disadvantage tourists who are interested in viewing these animals.

It was further reported during informal conversations with conservationists that the influx of vehicles has exceeded the carrying capacity of NCA. It was revealed that for tourists to enjoy optimum wildlife viewing, 50 to 75 cars can operate at one time in the crater. Currently there are more than 300 vehicles operating at one time in the Ngorongoro crater, especially during high tourist seasons. Congestion of vehicles has a negative impact in that it reduces visitor enjoyment and creates significant destruction of vegetation (URT, 2010). Congestion of vehicles associated with occasional off-road driving results in environmental degradation and stressed animals (Estes et al., 2006). This practice not only causes soil erosion but also kills some native vegetation and creates a favourable environment for growth of new non-native plant species. From the experience, most native plants disappear completely, if are continuously crushed by vehicles. Failure of plants to regenerate following this destruction would bring many negative consequences such as accelerated desertification, lack of forage for animals and water runoff. Desertification can also alter the beauty of the NCA's landscape and climate change has the potential to exacerbate this situation. In turn these consequences will affect the viability of wildlife tourism in the area if serious measures to limit the number of vehicles entering NCA are not taken.

Biodiversity loss

Biodiversity loss represents another stressor in the NCA tourism system as it was mentioned mostly by conservation experts. Discussions with NCA conservationists revealed there are considerable changes in the populations of wild animals in this area.

‘While these populations have tended to decrease since the 1960s, others have increased’ (Conversation with a conservation expert)

However, the experts acknowledged that there has been no critical research conducted to establish the cause of these shifts. Nevertheless, there are speculations that anthropogenic and climate changes have contributed to those shifts (Estes et al., 2006). Climate change can exacerbate diseases, drought, poaching and changes in vegetation, mentioned as the core factors of change in animal populations (conversation with one NCA conservationist). Animals most vulnerable to population decrease include wildebeests, hyenas, elephants, rhinoceros, lions and wild dogs. Factors such as diseases, recurrent droughts, changes in vegetation and poaching have been assumed to significantly contribute to the decline of these animals (conversation with a senior NCA conservation expert). Specifically, the senior conservationists associated recurrent diseases and droughts with declining wildebeest populations. The ecologists stated that livestock–wildlife related diseases might have been the major cause of the decline in the wildebeest population, recorded in the 1960s.

A study conducted by Estes (2006) to establish the trend of ungulate populations from the 1960s to 2005 found that wildebeests were a declining population, from around 14,677 in the 1960s to less than 8,629 between 1986 and 1992. A further decline to a mean of 6,517 wildebeests between 1993 and 1998 was recorded. Increased numbers were observed between 1999 and 2002, where a mean of 11,441 counts were recorded and this declined from 2003 to 2005 to a mean of 7,250 counts (Estes et al., 2006). The recent data indicates that from 2007 to 2011 the number recovered to a mean of 9,424 counts (URT, 2010). One of the interviewed conservationists revealed that the recovery of the wildebeest population was attributed to intensive disease control in livestock, and a decrease in the lion population who feed on wildebeest. Currently the wildebeest population recovered to more than 8,000 in 2011 (NCAA, 2012). However, the conservationist assumed that factors such as prolonged severe droughts coupled with changes in vegetation structure and reduced duration of precipitation still affect the

wildebeest population. These factors were associated with climate change although he insisted on further research to verify his assumption.

‘The population of wildebeests has increased over recent years because we have managed to control the disease which affects both the livestock and the wildebeest; you know wildebeest acquire these diseases from the cattle due [to] higher interactions among them – they graze together, they sometimes sleep together; although droughts and changes in vegetation can still be a challenge ... a thorough research to verify this is however needed as I am not a climate change expert’.

The statistical data obtained from NCAA (2012) indicated that lions are also under threat due to declining populations. For example, in the early 1980s there were more than 100 lions in the Ngorongoro crater but in 2006 there were only 49 lions. In 2011, this number declined to less than 34 lions (NCAA, 2012). One of the interviewed conservationists explained that inbreeding and diseases, mainly the Canine Distemper, are the major factors underlying the decline of lions. The conservationist revealed that limited movements of lions in and out of the crater due to increased human activities around the crater rim have caused this inbreeding.

‘Maasai are determined to protect their livestock from being eaten by lions and in so doing they disturb the lions’ movements in and out of the crater. As a result, the lions fail to mate with the lions from outside, the thing which cause inbreeding’.

Agricultural practice in 2008 by native residents also contributed to the problem of inbreeding (interview with conservationists). After 2008, agriculture involving crop production in NCA was banned. It was expected that the lion population would increase but numbers have dwindled to 15 lions in the dry season and 34 lions in the wet season. This signifies that other factors associated with climate change may be contributing to this decline.

Hyenas are also on the decline, according to interviewees. The ecologist further explained that in the 1960s, over 400 hyenas were counted in the Ngorongoro crater but by 2012 this number had reduced to less than 350 hyenas. Lack of prey (due to the decline of wildebeests and lions) along with diseases (especially pathogenic bacterium) was among the factors highlighted to have contributed to the decline of hyenas. Hyenas are both scavengers and predators (Swanson, 2007). They feed on wildebeests through

depredation (especially the young calf) and they feed on the remains of wildebeests after lions have made their kill and eaten.

The black rhino has also undergone a tremendous decline to extinction levels, especially after 1974 (Fyumagwa & Nyahongo, 2010). The literature shows that in 1974 there were about 700 black rhinos in SNP (Fame cited in Fyumagwa & Nyahongo, 2010). Data for rhino populations in NCA before the 1980s were not available. SNP and NCA form a shared ecosystem and therefore it can be assumed that rhino numbers in NCA were around 700 during this period. Data collected from NCAA has indicated that in the 1980s there were 67 rhinos but by the early 1990s the population had dropped to 10. The data for 2001 and 2005 indicated there was only one rhino counted in both dry and wet seasons. The NCA conservationists highlighted that serious illegal hunting (poaching) for rhino horns is the main factor contributing to their decline. In the 1980s, illegal immigrants from Somalia were at the forefront of poaching rhinos and elephants using heavy firearms (Fyumagwa & Nyahongo, 2010).

According to the interviewees, other factors were assumed to have contributed to the decline of rhinos in the Ngorongoro crater including severe droughts (resulting in lack of food), changes in vegetation (associated with a low feeding range), diseases and inbreeding. Of these problems diseases and inbreeding were mentioned more frequently by many NCA managers. According to Fyumagwa and Nyahongo (2010), however, diseases were not a big problem in the Ngorongoro crater before the 2000s. But in August 2000 two rhinos (a male calf and adult female) died from diseases yet to be diagnosed (Fyumagwa & Nyahongo, 2010). According to these researchers, a rhino calf was found with a high infestation of ticks during that year and throughout the 2000s some rhinos (including adults) were diagnosed with babesiosis disease and died. It can be argued that climate change might have escalated this disease. It is important to note here that in the 2000s the local community was enduring the serious impacts of prolonged droughts and many of their cattle had died. From this evidence, it can be argued implicitly that there is an association between rhino disease infestation and droughts. However, further research to establish a strong link between wildlife diseases and change is needed. The secondary data collected from NCAA (not presented here) indicated that elands and small ruminants, such as Thompson's and Grant's gazelles, have also shown decreasing trends. Interviewed conservationists associated this decline

with changes in vegetation and poaching. It was further reported by the conservationists that wild dogs have also disappeared in NCA due to unknown factors. Climate change might have contributed to this shift.

Biodiversity loss is also associated with poaching. Almost all respondents, except local community, mentioned poaching as one of the major factors contributing to biodiversity loss. Poaching involves illegal harvesting of wildlife and plants (NCAA, n.d.). According to one of the interviewed NCA managers, poaching is considered a real challenge for wildlife and future development of tourism in NCA. Poaching has a greater impact on the abundance of wildlife (both animals and plants) in NCA. Wildlife abundance is one of the major draw cards that attract tourists in Ngorongoro crater as well as in SNP (NCAA, n.d.). Poaching involves illegal hunting of wild animals for trophies (tusks and horns) and/or game meat, and illegal logging of timber in the Northern Highlands Forest Reserve (NHFR) for construction and firewood (URT, 2010).

Although poaching is a non-climatic stressor, this research established a close relationship between poaching occurring in NCA and climate change. The relationship is however indirect. This research established that poaching taking place in NCA involves both illegal hunting (of wildlife) and logging. The research revealed that illegal hunting and logging by some local community members, especially for meat and timber, is driven by climate change. Failure of livestock and crops, for instance, due to lack of rainfall and prolonged droughts were highlighted as the major driving forces for villagers to engage in poaching. For these people poaching is mainly a coping strategy, for subsistence and small-scale commerce (URT, 2010). It is well known that uncontrolled tree harvesting such as illegal logging can exacerbate climate change as it reduces carbon sequestration, increases desertification and further aggravates the availability of other resources such as water (Grainger, Smith, Squires, & Glenn, 2000; Hulme & Kelly, 1993; Stringer et al., 2009; Williams & Balling Jr, 1996).

Wildlife that become the victims of illegal hunting include rhinos and elephants (for horns and tusks), and elands and dikdik for meat and small-scale commerce (URT, 2010). According to the Maasai, eating a wild animal was considered a thing contrary to Maasai culture. But significant changes with respect to this culture have occurred as a

result of climate change. The Maasai have been forced to change their lifestyle due to failing traditional livelihood strategies as a result of climate change. Informal conversation with a local community member revealed that elands are the most preferred edible animal species. This respondent commented:

‘Because of low or failure of livestock production, we are sometimes forced to engage in illegal hunting for meat.’

‘Do you think I will let my family die because of hunger while there are plenty of resources around us? No! No! No! For a long time we depended on livestock production [as a major source our livelihood], [but now] livestock are dead from droughts and we are not allowed to cultivate crops ... if we decide to feed [ourselves] on those wild animals will [this] be wrong?’

Elands and dikdik are the main targets of poachers who hunt for meat in Ngorongoro. Climate change is one of the driving forces for poachers to engage in this illegal activity. These precious resources for tourism may become extinct due to poaching and climate change.

Informal discussions with villagers from outside NCA (non-Maasai), indicated that the need to acquire immediate cash was a driving force for them to engage in illegal logging for timber and the hunting of wild animals for trophies (e.g. elephants for tusks). The tree species that have been illegally harvested include the African Olive (*Olea africana*), Sandal-wood (*Osyris abyssinica*), Greentour (*Fagaropsis angolensis*) and Croton (*Croton megalocarpus*) (URT, 2010). Most villagers from outside the conservation area depend on crop production for food and immediate cash. Droughts affecting the livestock of the native Maasai also affect agricultural production in villages surrounding NCA and consequently the livelihoods of many farmers. In relation to these issues, the media reported that in April 2012 a group of farmers from a nearby village were caught injecting pumpkins and watermelons with poison intended to kill elephants. One expert from NCAA said:

‘Due to increased anti-poaching surveillance in the NCA, poachers trap elephants by using crops injected with poisons. In this trap untargeted animals also die’.

Even illegal immigrants from Somalia engaged in rhino poaching are said to have escaped poverty associated with severe droughts in their home country. For them

poaching was an alternative livelihood strategy. Poaching contributes to a reduction of wildlife available for tourism, and climate change has the potential to aggravate this situation.

The loss of biodiversity in NCA is not confined only to wild animals but also to plant species. The interviewed NCA conservationists informed that acacia trees which constitute the dominant plant species of Lerai forest in the Ngorongoro crater are disappearing. The forest provides habitat for male elephants, black rhinos (at night), baboons, velvet monkeys, waterbucks, bushbucks and leopards. The forest is the only habitat for leopards found in the crater and a refuge site for a small number of male elephants that have been pushed out of their families from NHFR of NCA. The disappearance of the Lerai forest will have profound implications for the residing animals and consequently the sustainability of wildlife tourism in NCA.

The conservationists associated the disappearance of these acacia trees to saline water caused by water inundation from Lake Makat. This occurs during a prolonged wet season. The conservationists insisted that saline water kills the saplings of acacia trees and consequently causes lack of forest regeneration. The conservationists purported that acacia trees in the Lerai forest are not disappearing but rather they are shifting toward the crater rim. Local community and tour guides associated the disappearance of acacia trees with water shortages as a result of pumping from Lerai springs for domestic consumption by local community, tourist hotels and lodges. These water shortages were also reported by Estes et al.(2006). Other interviewees have associated these factors with climate change.

Informal discussions with tour guides indicated that Lerai forest is an important site for wildlife ecotourism, because it is the only place in the crater where tour guides send tourists to view elephants and leopards. One tour guide commented:

‘In [the] crater, elephants and leopards are only seen in Lerai forest’.

Another tour guide was quoted as saying:

‘It’s hard for tourists to view elephants and leopards in the forest reserve where they predominantly live because of undulating terrain and the abundance of forest trees ... Especially the leopards tend to hide in dense

trees where you cannot see them easily. Leraï forest is the only convenient area that tourists can easily view the leopards and elephants’.

The researchers also made personal visits to the crater and particularly to the Leraï forest. They observed that acacia trees in the rim are scattered and do not grow in abundance to reflect a forest. The disappearance of forest is an indication of habitat loss, which can further impact wildlife and associated tourism negatively, if climate change intensifies. Nevertheless, critical research to verify this argument is needed.

Recurring livestock, wildlife and human diseases

Recurring livestock diseases represent another kind of stressor to the NCA villagers. Consulted livestock health expert informed that vector-borne disease from ticks alone claims about 34% to 36% of calves within their first year of life during critical periods of drought. It was reported that diseases occurred in 2007/08 when drought severity was high claimed the lives of about 90% of small ruminants born in NCA. The experts from NCA noted that, ‘the co-existence of livestock and wild animals increases the risk of contamination and makes it harder to control the diseases’.

Discussions with one of the NCA managers revealed that the co-existence of wildlife and livestock in NCA facilitates transmission of disease from wildlife to livestock and vice versa. The experts highlighted that most disease affecting livestock and wild animals are vector-borne. These diseases have existed since the 1960s and others were initially diagnosed in the late 1990s. The re-emergence of these diseases can be linked to climate change, although further research to verify this link is important. It is predicted that climate change will result in diseases in areas with no previous history of occurrence (Simpson et al., 2008). In NCA, diseases existed before the 1990s. These diseases include: Foot & Mouth (FMD), Contagious Bovine Pluero-pneumonia (CBPP), East Coast Fever (ECF), anaplasmosis, babesiosis, anthrax, mastitis, otitis; and Malignant Catarrhal Fever (MCF), tuberculosis, helminthosis and eye infections. Others problems include fleas, foot-rot, diarrhea, Rift Valley Fever (RVF), pneumonic pasteurellosis and mange. Newly diagnosed diseases include Bovine Cerebral Thailerosis (BCT), Contagious Caprine Pluero-pneumonia (CCPP) and Peste des Petits Ruminants (PPR). CCPP and PPR affect mostly the small ruminants. The negative consequences of these diseases on grazing animals include abortions, deaths and

Olson, 2006). Lack of adaptation may see climate change exacerbating other epidemics in NCA, which consequently affect tourism.

5.3.3 Perceptions of participants toward temperature and rainfall changes

The likelihood of extreme weather to influence visitation is well documented in the climate change literature (Gössling et al., 2006; Simpson et al., 2008). Although in wildlife tourism, the decision to travel is largely made based on perception and expectations to view wild animals in their natural settings (Higginbottom, 2004b; Melita & Mendlinger, 2011, 2013; Swanson, 2007), tourists, prior to travel, assume that the weather in respective destinations will guarantee their comfort (Gössling et al., 2006). Depending on perception, a certain magnitude of a particular weather parameter is perceived as optimal to guaranteeing comfort. Below or above this range, the weather is regarded as extreme and tourists consider it unfavourable (Gössling et al., 2006). The weather parameters of specific concern for tourists' comfort include temperature, precipitation and humidity (Gössling et al., 2006).

Extreme weather variations due to climate change are expected to have primary as well as secondary impacts on wildlife ecosystems (Thuiller, 2007). Most of the immediate impacts include temporary or permanent migration of wildlife species from their usual habitat to other more suitable areas (Hannah et al., 2007; Thuiller, 2007). Moreover, altered weather can lead to deaths and extinction of some wildlife species (Higginbottom, 2004a). Similarly, weather changes may slowly impact wildlife ecosystems as these changes may exacerbate environmental changes brought about by other factors such as environmental degradation, pollution, and the invasion of non-native plants or animals (Thuiller, 2007). Given the importance of wildlife in attracting visitors, both immediate and slow effects of weather changes on wildlife ecosystems may have greater impacts on tourism in the long run.

In this study, the analysis, according to perceptions of local community about changes in some of the weather parameters, such as temperatures and precipitation, was conducted. This involved analysing the parameters that climate change scientists considered to have had an immediate influence on tourists' and wildlife comforts. The assessment involved changes in temperature, precipitation, humidity and drought.

‘Over here, life has changed ... temperature has slightly increased ... children loved to gather around the fire during cold period but nowadays things are different’.

Similarly, some participants drew on their experience to compare the severity of the cold during the winter seasons:

‘The cold period of the past [time] used to be heavier indeed ... you can’t compare with today’.

Some participants from the accommodation sector (especially those who had lived for a long period of time in NCA) perceived observable changes in some vegetation cover caused by increased temperature.

‘There is [a] correlation between changes in some vegetation and increased temperature’.

Although these facts were not scientifically verified, local knowledge has played an important role in identifying changes in climatic conditions. This underlies the importance of local knowledge in designing adaptation strategies for wildlife tourism. The knowledge provided by local community can be used as a starting point for researchers to undertake scientific research on temperature changes in NCA to predict future changes.

However, a recent advance in climate change science research has shown that ‘most tourists believe that temperatures need to increase substantially before the effect on tourists can be felt’ (Gössling et al., 2006, p.170). In analysing travel patterns of British tourists, Madison (cited in Gössling, 2006) found that the maximum day temperature perceived as comfortable was 30.7°C, with even small increases leading to decreasing numbers of visitors. Although these researchers found there are also tourists who do not consider temperature as a major parameter for making travel decisions, should temperatures increase in NCA, this may have substantial effects on future tourism.

Perceived changes in precipitation

Precipitation is another weather parameter that has featured in various climate change research (Gössling et al., 2008; Scott, 2011). According to these researchers, increased precipitation can affect tourism in many interconnected ways. First, extreme

precipitation can negatively impact tourism as it can damage natural resources and infrastructure used by destinations to support tourism. Second, heavy precipitation can impact tourists' decisions to travel as this affects on-site comfort. Third, precipitation can exacerbate the outbreak of vector-borne diseases and affect the health of both local community and tourists. Given the fact that these impacts may distort tourism growth over time, it is important to understand their current effect on tourism and use the information generated to plan for future adaptations. However, as climate change research continues to unfold, there is limited existing evidence to explain the precipitation anomalies and consequences for wildlife tourism in Africa.

The IPCC (2007a) has predicted that precipitation will decrease in various parts of Africa, except in East Africa, where precipitation is expected to increase. Based on this prediction, two types of assessment were conducted. First, noticeable changes in precipitation trends were assessed according to perceptions of local community and rainfall data collected from meteorological stations. Interviews (mainly informal conversations) and FGDs were conducted with native residents although a few conservationists also provided useful input. The information was further verified by analysing rainfall data from meteorological stations whereby mean rainfall supported by graphical figures (see Figures 5-7 to 5-11) were used to present and discuss observations. Second, assessment as to whether damage had been caused by these changes was also undertaken.

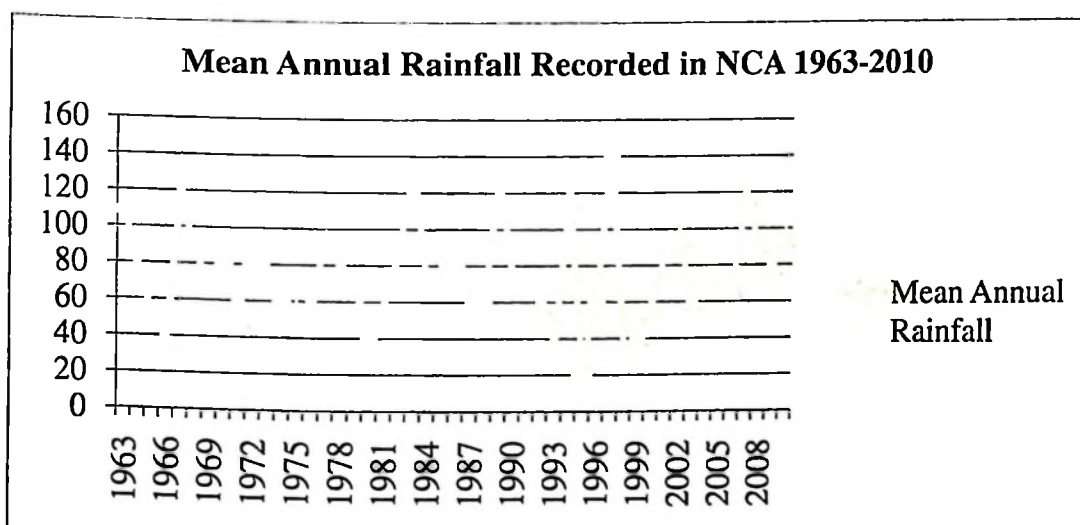


Figure 5-7: Mean annual rainfall recorded in NCA 1963-2010

Generally, the annual rainfall in Ngorongoro Conservation Area and all over Serengeti ecosystems exhibits a bimodal pattern characterised by seasonal variations that can have negative implications for the Maasai peoples' livelihoods, wildlife and vegetation, both temporarily and spatially. The trend of mean annual rainfall recorded in NCA over the period between 1963 and 2010 is shown in figure 5-7. The trend, as shown in figure 5-7, shows there are years characterised with high rainfall and other years with low rainfall. As seen from this figure the mean annual rainfall has been somehow more or less stable. On the other hand, the trends of seasonal rainfall are characterised by long and short rains. Long rains take place between March and June (see Figure 5-5). This also shows a kind of more or less stable trend since 1963 to 2010.

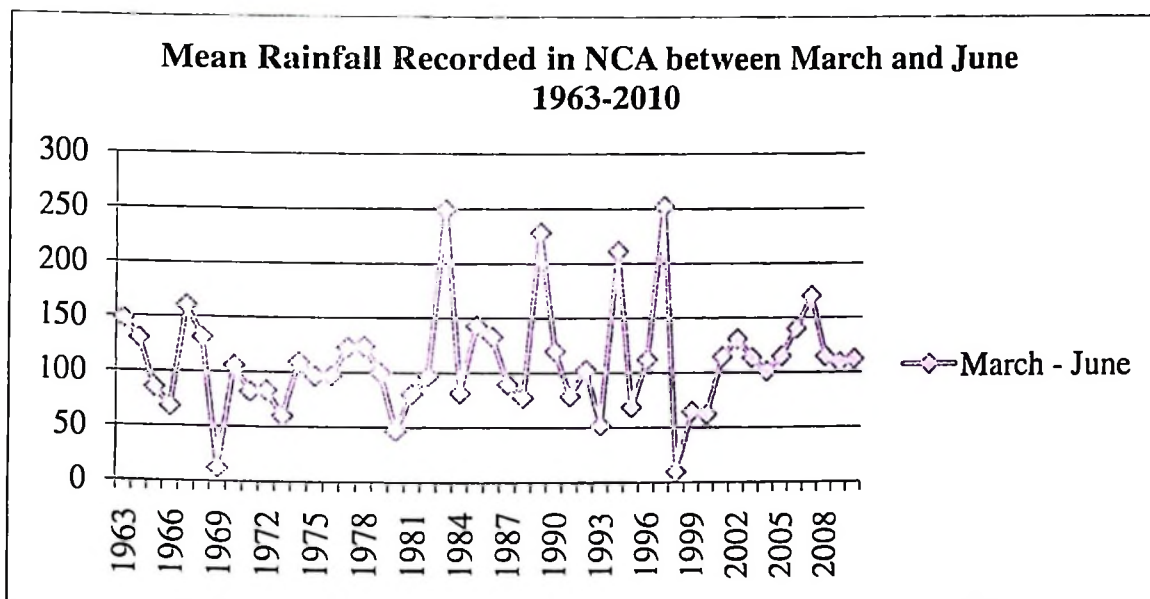


Figure 5-8: Mean seasonal rainfall recorded in NCA between March and June, 1963-2010

Similarly, short rains take place between January and February (see Figure 5-8). This period is referred to as 'short dry' rain season (SDR) (URT, 2010) and during this period the NCA is dry most of the time. Figure 5-8 shows that SDR have maintained a more or less stable trend since 1963 – 1993, but in the 2000s the trend has been characterised by increasing precipitation.

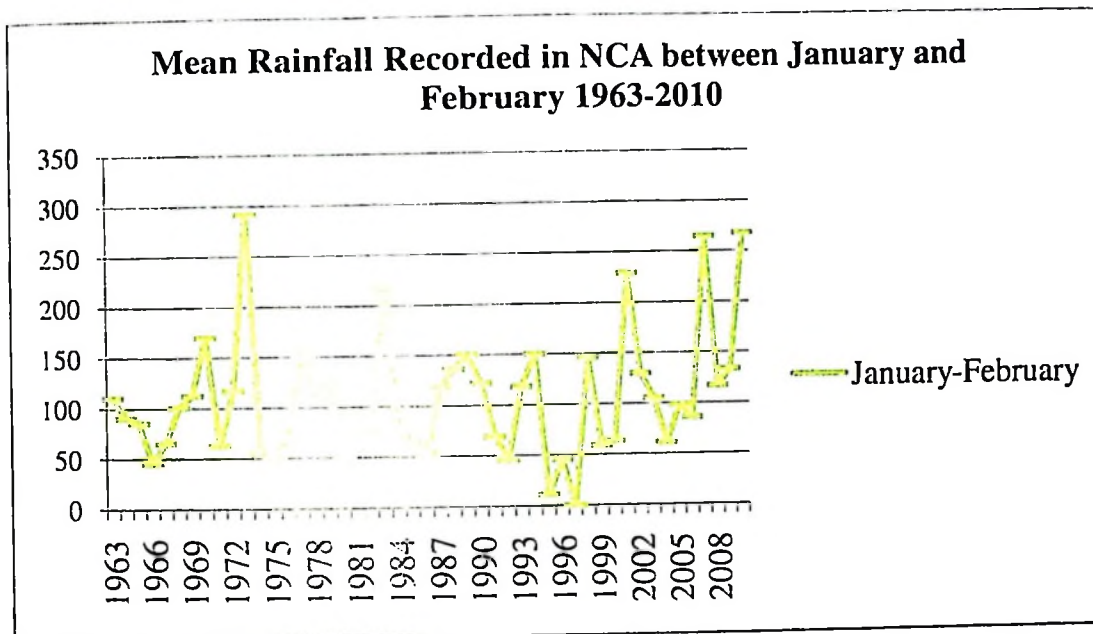


Figure 5-9: Mean seasonal rainfall recorded in NCA between January and February, 1963-2010

Likewise, there are short rains taking place between July and October, and the period is referred to as ‘long dry’ rain season (LDR) (URT, 2010). As shown in figure 5-9, there has been a decreasing trend, especially from the 1970s to 2000s. It is important to note that this is the period characterised by severe droughts where the local community lose most of their livestock. This observation suggests that when local community participants complain of severe droughts, they are referring to this period. This is an important observation for designing adaptation strategies, especially increasing preparedness.

The LDR sometimes extends to November and December where the period is characterised by large amount of rain. However, the rains during this period are unpredictable. Depending on the year large amounts of rains or no rains can be expected (URT, 2010). As shown in figure 5-9, there is a decreasing trend of precipitation in recent years. The period between of no rainfall sees many livestock dying. This information can also be useful for planning adaptations.

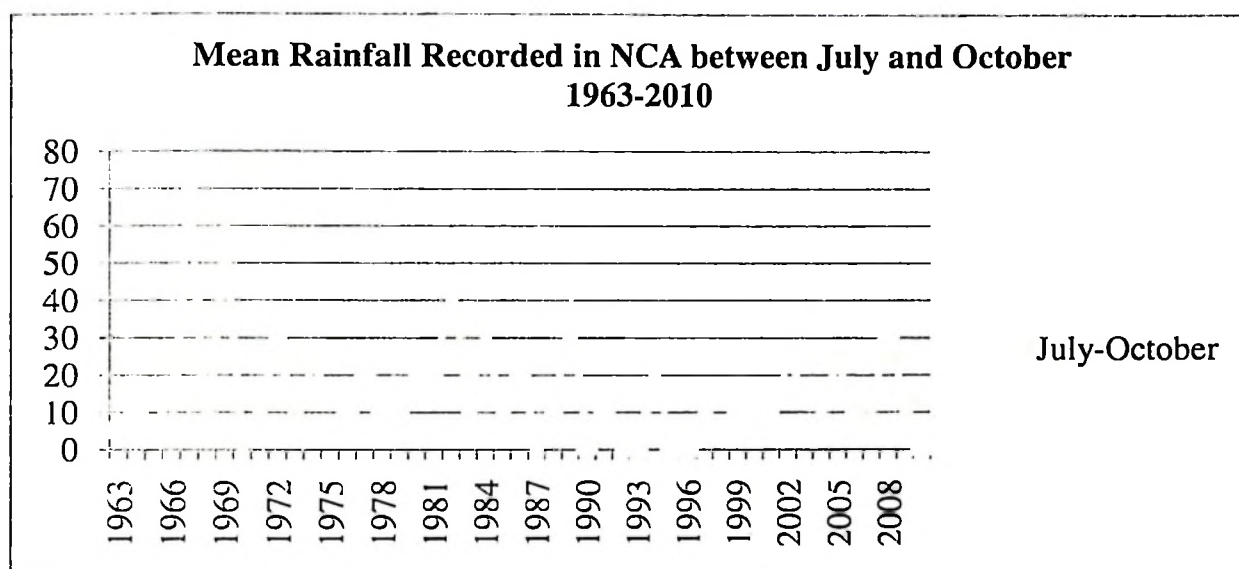


Figure 5-10: Mean seasonal rainfall recorded in NCA between July and October, 1963-2010

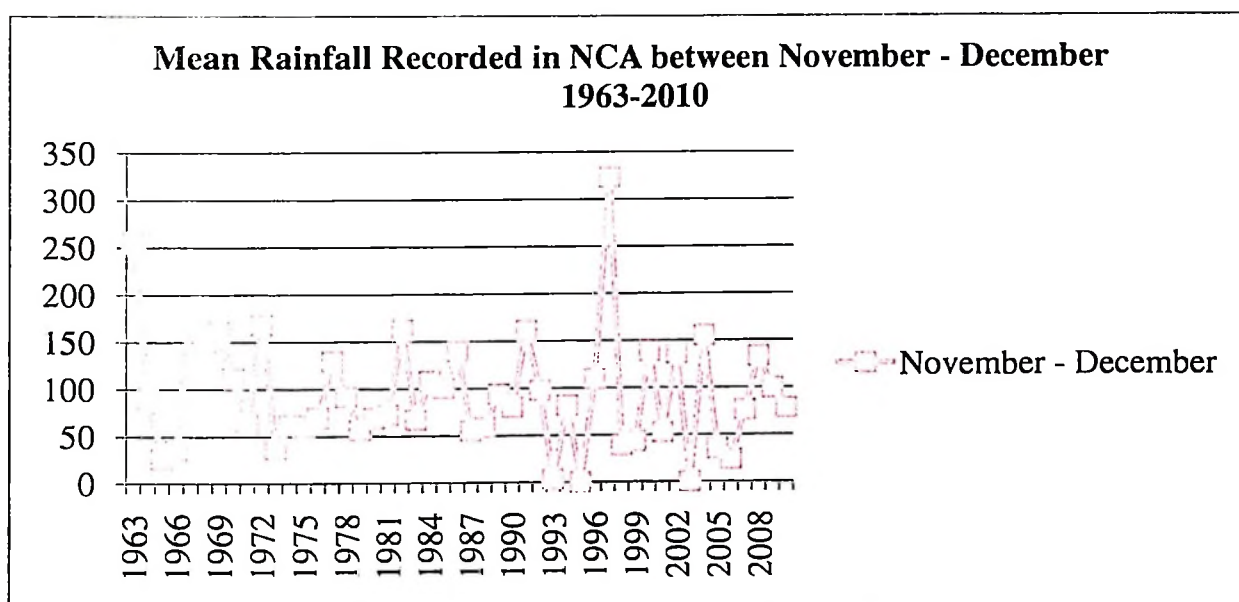


Figure 5-11: Mean seasonal rainfall recorded in NCA between November and December, 1963-2010

Thus rainfall, especially in the NCA lowlands (grasslands) is unpredictable. However, these people, especially native residents who have lived in this area for many years, have developed knowledge based on their accumulated experiences. This knowledge enables them to predict changes in precipitation regardless of variations and they adjust their economic activities to meet these predicted changes (informal conversation with a native resident on 23/02/2012). However, according to the findings of this study and in recent years, these people have witnessed variations in patterns of precipitation. The

outcomes of these variations have overwhelmed their capacity to predict and cope with coping responses they have in place. Many elders mentioned that they have failed to predict annual precipitation because it falls in irregular patterns.

Many interviewees (both native residents and conservationists) were of the opinion that there is a decreasing trend in precipitation in NCA. This is supported by participants in FGDs:

‘Normally Ngorongoro receives rains in November, but it is five months without a single drop. ... If we are not blessed with rain, come next month the situation will be really bad.’

It is believed that precipitation is one of the major factors that determine the seasonal flow of tourists to NCA. The propensity of tourists to be averse to higher rainfall in a tourism destination is further supported in a beach tourism study by Gössling and Hall (2008), who observed that a considerable proportion (75%) of tourists in Zanzibar, Tanzania mentioned precipitation as a major consideration when making decisions to travel. This implies that a higher maximum rainfall will influence future tourist flow. However, low rainfall can present an opportunity for NCA, because more tourists may opt to come to this destination during off season, which has always been characterised by heavy rainfall.

5.4 Chapter summary

The purpose of this chapter was to report and discuss the shocks and stressors that trigger NCA vulnerability to climate change. As mentioned in section 5.3, it is important to re-emphasise that shocks and stressors do not cause vulnerability, but when they occur they present as a reminder of a system's strengths and weaknesses in resisting them. The weaker the system the more it is vulnerable and the stronger the system the more it is resilient to shocks and stressors. The identification of shocks and stressors in this chapter presents an important step to the advancement of knowledge of vulnerability assessment in wildlife tourism. The remaining task is for the researcher to assess how the system can withstand these impacts. Chapters 6, 7 and 8 therefore present the major determinants of system vulnerability (i.e. exposure, sensitivity and adaptive capacity).

CHAPTER SIX: SYSTEM EXPOSURE

6.1 Introduction

This chapter presents the identified factors and processes that influence the exposure of the NCA wildlife tourism system to shocks and stressors. As explained in the literature review, exposure is one of three determinants of vulnerability. It is defined as the degree to which a people, animal, wildlife, or any asset comes into contact with shocks and/or stressors (Clark et al., 2000, p.2). As discussed in the literature review, assessing exposure is an important step in assessing the vulnerability of a tourism system (Schröter et al., 2005; Turner et al., 2003; Williams et al., 2008). This involves the identification of features that play a role in influencing vulnerability. This will in turn provide a deeper understanding of how these factors combine with the exposure unit to influence the system's vulnerability and/or resilience. (This chapter addresses part two of objective number three as shown in table 6-1 below.)

Table 6-1: Research objective addressed in Chapter 6

Research Objective	What information is needed?	How information will be gathered?	Why the method is appropriate?
3 (ii) Assessing the NCA exposure to shocks and stressors	Identification and analysis of exposure factors that heighten or reduce vulnerability of the NCA	<ul style="list-style-type: none">• semi-structured interviews• focus group discussions• informal discussions• analysis of secondary data	Helps to understand the context and extent of vulnerabilities to shocks and stressors

Nevertheless, before presenting the factors that determine the exposure of NCA to shocks and stressors, it is important to recap on what constitutes a tourism system's exposure to shocks and/or stressors.

6.2 The exposure concept

Exposure is generally determined by the magnitude of shocks and stressors including stress entities (Calgaro, 2011; Calgaro et al., 2009, 2013a, 2013b) as well as the destination's defining characteristics (exposure factors) including human population size and biophysical and built environmental characteristics (Calgaro, 2011; Calgaro et al., 2013a, 2013b; Jiang et al., 2012). It has been widely acknowledged, in the literature,

that exposure to multiple shocks and stressors are a real concern, particularly in developing countries, because their various economic sectors (including wildlife tourism) possess factors (and processes) that expose them to climate change (O'Brien et al., 2004). In a coupled human-environmental system, vulnerability to climate change occurs where large groups of people (local community and visitors), animal species (both domestic and wild), plant species and/or habitat are exposed to climate change shocks and stressors (Becken & Hay, 2007; IPCC, 2001, 2007a; Moreno & Becken, 2009). Our major task here is to identify and assess how these exposure factors influence the vulnerability of these groups.

Assessing exposure involves analysing various biophysical characteristics including human population size, natural terrain/topography/landscape, and ecosystems and the built environment. Collectively these characteristics reflect the perceived tastes and preferences of visitors (Calgaro, 2011; Calgaro et al., 2013a, 2013b; Jiang et al., 2012). However, it is important to note that the vulnerability of an exposure unit is mediated by its adaptive capacity (Williams et al., 2008). As such, assessing exposure alone is not sufficient to conclude whether the unit is vulnerable or resilient until other determinants of vulnerability (i.e. sensitivity and adaptive capacity) are assessed (as presented in chapters seven and eight respectively). Table 6-2 summarises exposure factors as identified in this research.

Table 6-2: Exposure factors

Exposure factors	Some illustrative examples of exposure
Human population characteristics	<p>Population size:</p> <p>‘The current trend of Maasai population growth and the increased tourism development [in the NCA] threatens not only the wildlife but also the water availability and wellbeing of the Maasai themselves. We think that the current population has exceeded the NCA’s carrying capacity. There’s a great danger in future.’</p> <p>‘Engagement in illegal activities that contributes to the destruction of environmental resources has been accelerated by population increase. This exposes the land to various climatic factors such as desertification, droughts and/[or] erosion’.</p>

Biophysical characteristics	<p>Topography: ‘Because most of the [acacia] trees [in Lerai forest] are too old, the elephants can sometimes fell or uproot them upon feeding causing the area to be invaded by bush plant species.’ ‘Because it is not easy to carry an intensive patrol in the thick forest, the hunters consider it as an advantage to conduct their illegal activities in these forests.’</p> <p>Ecosystem functioning: ‘We sometimes face a serious loss of cattle from theft by the neighbouring tribes. Sometimes this end up in war-like situation between our tribes and it is big threat to our life because it further reduces our economic base which depends on livestock.’ ‘Seasonal variations along the ecosystems determine where the migrants will feed, drink or calve. Thus, any environmental stress that would deter the timing of these migrations will have significant impacts on tourism.’</p>
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6.3 The NCA wildlife tourism exposure to shocks and stressors

The following contextual characteristics were considered in assessing the factors that determine the NCA wildlife tourism system exposure to shocks and stressors:

- i. the NCA population characteristics (mainly the population size);
- ii. the biophysical characteristics (natural topography, ecosystem functioning and usage patterns of natural resources) and;
- iii. The built environment (settlement locations).

6.3.1 Human population size

Mooney et al. (2009) reported that over 60% of environmental resources critical for tourism have been diminished because of increased human activities over the past 500 years. The extent to which these resources are diminished is subjected to human population size. This is to say that the greater the human population size, the greater the extent to which natural resources are consumed. Exceptional cases can be where technological innovations are used by a small population to execute activities on a larger scale with minimum resources. Increased diversity, frequency and scale of human activities have depleted and modified ecosystem resources and consequently increased their exposure to the impacts of climate change (Hughes et al., 2003; Mooney et al., 2009). The data of human population growth in NCA further supports this assertion.

The NCA population comprises larger permanent groups of native (indigenous) residents (Maasai) and temporary, minority non-resident groups composed of the

NCAA and lodge staff and their dependents plus illegal immigrants from the surrounding villages (URT, 2010). These groups account for accelerated growth of the population in NCA. Interviews with some NCA conservationists associated population growth in NCA with free social benefits provided by NCAA to support the local community. There's speculation that Maasai from other areas migrate every year to NCA so they can enjoy these services. Similarly, conservationists associated population growth in NCA with increased tourism development. According to these participants, tourism attracts those who seek employment in lodges and when they retire they remain in the area.

According to the Tanzania national census conducted in 2013, the human population in NCA has grown enormously from approximately 10,000 people in 1954 to over 62,000 people in 2013. In 1999 the population had already reached over 52,000 people (URT, 2010). This implies that between 1999 and 2013 the overall NCA population grew by 20.5% or at a rate of approximately 1.5% to 3% annually (Homewood et al., 2001, 2009; Melita & Mendlinger, 2013) while the overall population growth rate in NCA was estimated to be around 3.5% between 1999 and 2002 (URT, 2010). Despite all these changes, the size of NCA since its establishment in 1959 has remained the same. According to the environment impact assessment conducted in 2007 by NCAA, NCA can only accommodate 25,000 people with livestock (Nyahongo et al., 2007). This means the current population has exceeded the carrying capacity of the area, and this will have significant impacts on the consumption of ecosystem resources.

The implication is that the same ecosystem services available in NCA are redistributed to the increased population. This will result in the use of resources beyond acceptable limits. Some of the participants of this study acknowledged that increased human population and associated activities in and around NCA are among the major contributing factors to the depletion of some natural resources. Increased population size further threatens NCAA's capacity to provide basic social services to local community and conserve natural resources. This research established that reduced water availability in Ngorongoro is associated with human population growth. In support of this trend, one conservationist said:

‘The current growth trend of Maasai population and the increased tourism development [in NCA] threatens not only the wildlife but also the water availability and the wellbeing of the Maasai themselves. We think that the current population has exceeded NCA’s carrying capacity. There’s a great danger in future. We might not be able to supply the necessary services’.

Climate change will also exacerbate water shortages because of its relationship with precipitation and droughts, which are all attributes of water availability. Further support can be found in the study conducted by Estes et al. (2006). Estes and his colleagues linked the water flowing to the crater with precipitation and human population growth. According to Estes (2006), for the crater ecosystem to function, a minimum average annual precipitation of 400 to 500mm is required to enter the crater (Estes et al., 2006). This amount is sufficient for the hydrological processes and support for plants and wildlife throughout the year. Thus, any reduction in the quantity of water flowing to the crater, as a result of increased human consumption (or climate change), can alter the growth patterns and quality of pastures and other plants (Estes et al., 2006), and consequently affect the growth, movement and welfare of wildlife (Ndibalele, 2010). This may expose wildlife and humans to stressors such as droughts, diseases and predation. This may finally lead to wildlife loss. This study revealed that participants associated wildlife loss with water shortage and with increased exposure of plants to severe droughts.

Conservationists feel that human population growth in Ngorongoro is also linked to increased illegal activities and wildlife grazing conflicts in NCA. Examples of such illegal activities during discussion with some NCAA staff include: the setting of wildfires (uncontrolled fires); illegal hunting; and illegal harvesting of forest products such as honey, firewood and timber. These activities are mostly conducted in NHFR (URT, 2010). The staff mentioned that among these illegal activities, wildfires are the most dangerous activity in the NCA ecosystem, especially if set in forest reserves. As discussed in chapter four, NHFR is a major water catchment for a large volume of water consumed by both humans and wildlife in and around NCA.

However, interviewees acknowledge that fire has some positive benefits for the ecosystem if fire occurs in the grasslands under intensive control measures. Currently,

fire is restricted all over NCA. Some conservation experts in NCA felt that those responsible for setting wildfires in NHFR mainly come from the surrounding villages, while native residents are responsible for setting fires in the grasslands. While honey harvesting is the most likely driver of wildfires in NHFR, the need to encourage sprouting of fresh grasses after the onset of rain is the principal driver of wildfire in the grasslands. One conservationist commented:

‘Wildfire used to be a serious problem in the past years but due to increased surveillance conducted by the NCAA staff the activity has ceased. At the moment it is not a critical issue due to increased surveillance but if [it] occurs it exposes the NCA land to various climatic impacts.’

It is however acknowledged in the general management plan (GMP) 2006-2016 document that this problem still exists. With regard to illegal human activities, some staff from NCAA headquarters during informal discussion said:

‘Uncontrolled fire has been the most dangerous illegal activity in NCA for the past years. Well, it has some advantages and disadvantages but for conservation, the disadvantages surpass the advantages’ (NCAA senior employee).

‘As life hardship increases people design different coping strategies; some [of these strategies] are good as they favour conservation, others are bad because they involve illegal practices that are against conservation. In most cases, the frequency of these practices and their impacts on the ecosystem tends to increase with increase in human populations and the severity of a [felt] problem. The harder the problem [associated with lack of alternatives], the more the people engage in illegal activities such as poaching’ (NCAA junior employee).

According to the NCA conservation experts, uncontrolled fire is used by indigenous residents for controlling ticks and to stimulate the sprouting of fresh pasture growth for livestock when the rains set in. While this activity can be beneficial to both domestic and wild herbivores, it can be argued that uncontrolled fire and associated illegal activities, such as deforestation, accelerates the exposure of the NCA land to various climate related impacts (e.g. desertification, soil erosion and invasion of non-native plant species). In support of this argument, the current NCA GMP provides the following arguments, which can be associated with climate change.

‘Unplanned fires have great impacts on vegetation of the area. High concentration of herbivores on burnt areas following new tender grasses, in most cases leads to trampling of the sites. This may result into the disappearance of some plant species and microorganisms. Sometimes, following changes in vegetation composition, habitats for other creatures such as the ground nesting birds may also be interfered [with] due to fire intensities and frequency of burning. The occurrence of fire on the same area for many years may result into over-burning making the land bare and thus vulnerable to invader plants and the resulting soil erosion’(URT, 2010, p.37)

Although currently these shifts seem to have little or no effect on NCA tourism, they pose a serious challenge for the future of wildlife tourism in this area, especially under severe climate change.

6.3.2 Biophysical characteristics

Another important way of examining the destination’s exposure to shocks and stressors is by assessing its biophysical features. As many researchers have found, the biophysical characteristics of a destination can heighten or reduce the exposure of a stressed unit (Calgaro et al., 2013a, 2013b). The biophysical features mostly considered include natural terrain/topography, ecosystem functioning and usage pattern of natural resources (Calgaro et al., 2013a, 2013b). In this study the destination’s topography and ecosystem characteristics were considered for assessing the exposure of the major components of the NCA’s ecosystem.

Topography characteristics

The topography of NCA is heterogeneous with great variations in vegetation cover, wildlife resources and natural terrain. These variations are a source of different ecosystem processes occurring in this area. Topographical heterogeneity has both beneficial and detrimental impacts on both humans and wildlife. Hobbs et al. (2008) assert that ‘access to heterogeneity of landscape is an important attribute of grazing ecosystems worldwide, and that fragmentation of these systems, even when it proceeds in the absence of habitat loss, can limit options of people and animals’(p. 776). However, this study established that topography heterogeneity can become a source of exposure of people, livestock and wildlife to various climatic stressors. This section discusses how the topographical characteristic features contribute to the exposure of

various elements of the NCA wildlife tourism system. It is important to note that the description of NCA topography is not new, but the description of how it relates to climate change and tourism is new.

The NCA topography is composed of two main landscapes; (1) the *Ngorongoro crater*, which consists of open and flat bottom grassland and the steep slope edges, the rim; and (2) the *crater highlands*, composed of the elevated and undulating mountain ranges which emerge and extend to the west as the mountain slopes down to its base. The landscape forms different sets of vegetation on the mountain slope which determines the distribution of wildlife (Galvin et al., 2004). While the mountain is largely covered by montane forests (i.e. the Northern Highland Forest Reserve), the undulating hills are covered by semi-arid and arid vegetation. There are various patches of medium to long grasses and bush vegetation towards the bottom of the mountain. At the bottom, from where different hills emerge, there are patches of open, short grass basins that are evergreen due to high moisture retention capacity of their soils. The bottom of the Ngorongoro crater is largely covered by short grasses and two patches of forest (Leraï forest) dominated by acacia trees (*Acacia xanthophloea*) (Estes & Atwood, 2006). Moreover, the crater contains water bodies: mainly lakes and swamps (marshes). Examples of the lakes in crater include the Lake Magadi (also known as Lake Makat), where as the swamps and water marshes include Gorogor swamps, ... While the lakes are surrounded by short and predominantly medium to long grasses, swamps are predominantly covered by long grasses.

The exposure of wildlife, livestock, habitat and community to climatic stressors is explained partly based on different patterns of rainfall, vegetation and wildlife gradients. The high variability in rainfall patterns in both space and time, which in turn dictates the supply of water and the distribution of vegetation and wildlife, is the most notable influence of topography heterogeneity on ecosystem's exposure to climate change. There is a rainfall gradient that extends from the NHFR mountains down to the undulating hills and crater. The side facing the easterly trade winds (windward side) of the NHFR mountain normally receives an average of 800mm to 1200mm of rain a year while the leeward side (less steep) – largely covered by short grasses and acacia bushes – receives only 400 to 600mm or below of rain each year (Estes & Atwood, 2006). Some interviewed NCA managers were in view that sometimes the rainfall can even go

down below 200mm, especially in the arid areas of NCA. This study revealed that The Ngorongoro crater receives about 400mm to 500mm each year, which is less than the rainfall on the mountain. However, due to its location, the crater benefits from natural springs and extra water run-off from the mountain and hills. And because of this advantage, the crater has sufficient water all year round (Estes & Atwood, 2006). However, this research noted that during severe and extended droughts, water in the crater lakes (especially Lake Magadi) becomes extremely shallow with high salinity (According to discussions with some of the of NCA managers). Marshes may sometimes dry up although the soil moisture content still allows grasses to grow.

While the mountain forests receive higher amounts of rainfall annually, adequate rainfall from year to year cannot be guaranteed for arid and semi-arid grasslands. The factors that determine the seasonality of rainfall is beyond the scope of this study. However, the presence of rainfall gradient makes some areas, especially arid and semi-arid grasslands (where most ungulates and livestock feed), more exposed to the impacts of extreme weather (e.g. severe droughts). It is important to note that the local community becomes more vulnerable to droughts because most of them are located and feed their livestock in semi-arid and arid areas. Other areas are highly restricted for conservation reasons (Sinclair et al., 2009).

Furthermore, the heterogeneity of the NCA's topography and the presence of rainfall gradients play a central role in creating vegetation gradients. These gradients are associated with variations in abundance, quantity and quality of vegetation. Ungulates migrate according to these variations and water availability (Gereta, 2010). This influences the feeding patterns of different populations of migrating as well as permanent wildlife, which in turn dictates their distribution both in space and time. In supporting this observation, Ndibalema (2010) states that seasonal conditions and differences in nutrition of food resources determine the movements of wildebeest, zebras and gazelles between different habitats in NCA. Very often these animals tend to concentrate in areas (patches) which offer water and vegetation suitable for their nutritional requirements (See Figure 146). This study observed that consequently, the differential distribution of animals and their habitat will determine their exposure to different shocks and stressors.

It was also observed that animals that congregate in areas, according to water availability and vegetation abundance, determine levels of exposure to factors such as: overgrazing; predation; illegal hunting; congestion of tourist vehicles; establishment of tourist facilities (mainly campsites); and soil compaction by grazing animals and tourist vehicles; leading to environmental degradation, droughts, encroachment of invasive species and water shortages. All these are subject to climate change exacerbation. Furthermore, because ungulates graze together with livestock in most of the grassland areas, with the exception of the crater, the concentration of both livestock and ungulates in these areas facilitates the transmission of diseases between wildlife and livestock and this contributes to their population decline. Climate change may add more stress unless effective adaptation strategies are designed.

The presence of abundant nutritious pasture and permanent water of the Ngorongoro crater floor supports a large population of up to 25,000 permanent wild animals – composed predominantly of herbivores – including wildebeests, zebras, gazelles, buffalos, elands, kongoni, warthogs and rare black rhinos (NCAA, n.d.). The crater swamps and lakes provide support for hippos and marine birds including flamingos. The two forest patches growing on the crater floor provide habitat for elephants, waterbucks, reedbucks, baboons, velvet monkeys, bushbucks and some leopards and cheetahs (NCAA, n.d.). Predators such as lions and hyenas are also present. All these have implications for environmental degradation.

The presence of abundant wildlife in the crater results in congestion of tourist vehicles. This is associated with wildlife disturbances, environmental degradation and pollution (mainly dust). The presence of differential habitat patches and rare animals in the crater cause further degradation to the environment. This is because tourists tend to gather around the rare animal species in their vehicles to watch the activities. The best explanation for this is that some wild animals, such as black rhinos and wild dogs, are considered as rare species and endangered (according to the categorization by the International Union for Conservation of Nature (IUCN)), so they are subject to extinction. Many tourists want to see these animals before they become extinct in the wild. As such, tour guides will strive to track the animals in the crater for their tourists to access and view. Upon identification, it was reported during interviews with tour guides that they will use radio calls to invite other guides and their visitors; within a few

minutes the animal will be surrounded by many vehicles. This practice was considered as the most detrimental practice to both animals and the environment. According to some tour guides this practice causes animal stress, facilitates off-driving and causes the destruction of vegetation cover. These practices consequently expose the area to droughts, soil compaction, erosion and invasion by non-native plant species. Furthermore, the disturbances from vehicles and tourists may stress the animals and consequently increase their exposure to diseases. One tour guide lamented:

‘One of the practices I should consider as bad to the health of the environment in the crater is the use of radio calls by the drivers to invite their fellows when a rare animal species is located. For example, because animals like the black rhino don’t like disturbances from people and other animals they tend to graze far away in isolated areas. Sometimes it takes time to trace and see it ... mind you tracing is done by a car and sometimes involves off-road driving! When a driver manages to see it he will call other drivers and in counted minutes, the animal will be surrounded by so many vehicles ... something that cause a lot of disturbances to the animal and tourists themselves and also degrade the environment. This is a bad practice that should be addressed by the relevant authorities.’

Furthermore, the presence of two Lerai forests in the crater provides a refuge for elephants (normally aged males). Although the presence of elephants in crater forests is beneficial to tourism, as it provides tourists with the only opportunity to view elephants in the crater, increased populations of elephants in these small vegetation patches may contribute to changes in vegetation and water volume in the crater. For example, it was reported by some NCAA staff that the current state of Lerai forest disappearance is partly caused by the increased elephant population due to overconsumption and destruction. The interviewees revealed that the number of elephants migrating from the mountain to these forest patches sometimes exceeds their carrying capacity and therefore increases the destruction of acacia trees that the animals feed on.

‘Because most of the [acacia] trees [in Lerai forest] are too old, the elephants can sometimes fell or uproot them upon feeding causing the area to be invaded by bush plant species.’

This combined with other factors, such as salinity, the low quantity of water entering the forest and climate change, kills the acacia trees and consequently the whole forest is

in danger of disappearing. The eradication of trees exposes the land to the effects of droughts and invasive species.

Similarly, the presence of vegetation in and around the lakes and the natural springs (swamps) of the crater are beneficial to the ecosystem, because they provide alternative feeding and drinking areas when the short grasses and water in other areas are depleted by droughts. However, it is said during the interview that the carrying capacities of these areas are not sufficient to support the large populations of non-migratory animals that feed there during severe droughts. As such, overgrazing and trampling associated with over-extraction of water is common in these areas. The effect of overgrazing and trampling becomes more severe as the drought extends. Overgrazing and trampling not only facilitate desertification and soil compaction but affects water movement above and below the soil surface, and finally may expose the natural spring to droughts and invasion by non-native plant species. Moreover, concentration of many animals in a small area may increase the exposure of unaffected animals to diseases transmitted by affected animals.

Similarly, NHFR in the mountain provides habitat for large populations of elephants, leopards, cheetahs and buffalos. Sometimes the dikdik and the rare mountain reedbuck move from the crater rim and find refuge in NHFR. All these animals are targeted by poachers. As mentioned earlier, poaches may use these forest thickets as hiding areas, without being noticed by patrolling game officers. One NCAA staff member commented:

‘Because sometimes it is not easy to carry an intensive patrol in the thick forest, the hunters use this as an advantage to conduct their illegal activities in these forests.’

Ecosystem characteristics and functioning

Another way of understanding the destination’s exposure to shock and stressors is by looking at its ecosystem characteristics and functioning. Consideration of ecosystem characteristics and functioning in assessing the exposure of wildlife tourism to climatic stressors is based on recognition that wildlife tourism is an integral component of the ecosystem. And the ecosystem, from which it draws its tourist products, is considered vulnerable to climate change (Mooney et al., 2009). Some studies have predicted that

climate change will alter the supply of ecosystem services vital for human wellbeing including recreation and tourism (Becken, 2010; Mooney et al., 2009; Schröter et al., 2005). For wildlife tourism to maintain its future, especially under climate change, a healthy ecosystem based on a sustainable supply of services is required.

The ecosystem has been defined as ‘a biotic community or assemblage and its associated physical environment in a specific place’ (Pickett & Chadenasso, 2001). ‘Ecosystem functioning represents the conditions and processes through which natural ecosystems and the species that make them up sustain and fulfil human life by maintaining biodiversity and the flow of ecosystem services/goods such as fresh water, forage, fuel wood, natural fibers, biochemical, spiritual, recreation and ecotourism products’ (Haines-Young & Potschin, 2008, p.16).

The basic questions concerning the relationship between ecosystem functioning and climate change arise from the need to understand *how* and *why* this functioning contributes to exposure. To answer these questions, reference is first made to Sinclair et al. (2008), who emphasised that the fundamental issue arising from any ecosystem investigation involves the identification of major processes underlying its components. This identification enhances the researcher’s understanding of how the different components are linked. In the context of climate change, this involves the examination of how each of the system components affect the processes underlying the functioning of the respective ecosystem, in the production of services that are critical for tourism and wellbeing; and the examination of how climate change can exacerbate these processes (Mooney et al., 2009).

The NCA ecosystem is made up of biotic and abiotic components. The major biotic components include various species of wild animals, plants, human beings and micro-organisms; the abiotic components include environmental factors such as water (lakes, ponds and rivers), mountains, hills, soils and weather, all which constitute a habitat. The interactions between these components yield various processes whose outcomes represent the functioning of the NCA ecosystem in delivering services that are beneficial, not only to wildlife and tourism, but also to the community. However, it is from these processes that various exposures to climatic shock and stressors can occur.

Ecosystem processes arising from biotic interactions include the organisms' struggle for survival. Various relationships that stem from this struggle to acquire resources necessary to enhance life constitute ecosystem functioning. Usually, individual organisms struggle to: acquire food, shelter, mates, and protection from extreme climate; and avoid becoming food for other animals (Sinclair, 1999). Abiotic factors provide support for these biotic processes where individual organisms (plants, wild and domestic animals and human beings) interact with each other or with their environment. And in so 'doing they affect each other by removing food [or nutrients from the soil], or displacing others from an area where food, shelter or mates might be found; or simply by eating them' (Sinclair et al., 2009). If it happens that climate change generates unfavourable environment for some of the biotic components, these relations/interactions will produce negative or positive outcomes which may expose some organisms to shocks and stressors.

The major lines of interaction arising from these processes include: human-human; human-plants; human-wildlife; human-environment; plants-plants; wildlife-wildlife; wildlife-plants; wildlife-environment; and wildlife-livestock relationships. The evidence from this study shows that some of the stressors identified in the previous chapter have been accelerated by these interactive processes. All these interactions are interrelated and discussed herein.

Human-human interactions: Discussion with various participants indicated various social conflicts arising from the human effort to acquire material wealth. These conflicts may become a source of exposure to shocks and stressors. From the discussion, three main sources of social conflicts in NCA were mentioned. These include conflicts among residents (intra- and inter-tribal), conflicts between native residents and conservationists, and conflicts between native residents and the hunting companies. In most cases these conflicts arise when an individual member of local community or a group is involved in a dispute with another resident or group. These are intra- and inter-tribal conflicts.

Usually, they arise when individual members of a community want to gain wealth at the expense of other community members of the same or different tribe. According to the interviewees, a person's wealth is determined by having as many cattle as possible.

Having many cattle for the majority Maasai is considered a social status symbol of wealth, which each individual tribesman would strive to achieve. From FGDs with the local community members it was apparent that there are usually three major means of cattle acquisition. These include: natural cattle husbandry where cattle multiplication occurs through natural reproduction (major means); purchasing (ranked second) and stealing from other people (as a last resort). According to Maasai, purchasing is the only means that is free from conflict but it depends on cash availability. For cattle husbandry, it was reported that conflicts may arise in the process of one individual (or a household) trying to access a piece of pasture owned by another individual (or family household) for grazing, without the consent of the owner.

‘We sometimes face a serious loss of cattle from theft by the neighbour tribes. Sometimes these [conflicts] ends up in war-like situation between our tribes and they are a big threat to our lives because they reduce our economic base, which depends on livestock. Sometimes these conflicts cause human deaths’ (Livestock herder from Moklal village).

Similarly, conflicts may arise when one tribe or businessmen try to steal cattle from native residents. Cattle theft is accelerated by severe droughts and the need to acquire immediate cash. Some participants revealed that it pains them a lot when someone’s cattle die from droughts while in other areas cattle are surviving. A Maasai participant said:

‘You find almost all your cattle have been wiped out by droughts, you don’t have money to replace them by purchasing, and you don’t have money to feed the family [because the livestock are gone], what could you do if it were you? Stealing is the only option you will remain with’.

Social conflicts may also arise between native residents and registered commercial hunters. For example, frequent conflicts between Maasai and hunting companies in Kakesio ward were reported by both interviewees and the media (Mushi, 2013). The major source of these conflicts is the disputed land that is deemed by Maasai as their important feeding area, while the hunting company claims ownership of it. Maasai claim that because they have been using this land before the coming of the hunters, there is no justification for the hunting company to claim ownership.

‘The area that is conflicted is very important for us to feed our livestock. We have been using this area for quite a long time [to feed our livestock]

even before the coming of this company; I wonder why this company claims ownership of the area' (Maasai interviewee).

The newspaper *Jambo Leo* reported on April 22, 2013 that the major source of conflict is the penalty of about Tsh700,000/= (Tanzanian currency, approx. US\$466) imposed by the hunting company when a herder is caught grazing livestock in the disputed area.

'The border conflict is threatening peace [in our area] following the rising tension between Maasai and the company following the Maasai's intention to encounter the company officers who are involved in imposing the penalty of Tsh 700,000 when a person is caught grazing in the area'(Mushi, 2013).

In general, it was reported that these conflicts reduce the capacity of some local community members to cope with the impacts of droughts.

Human-wildlife interactions: In NCA, human beings interact with wildlife in many ways. Some interactions are beneficial for tourism (e.g. interactions aimed at conserving wildlife are beneficial). These interactions however may sometimes not be beneficial. For instance, the engagement of some community members in poaching is not a beneficial practice. For some tribes, such as the minority Datoga, hunting is their main livelihood and they never practice pastoralism (Swanson, 2007). The major consequence is the loss of wildlife populations. Likewise, under severe changes to wildlife and plant populations due to climate change, future social conflicts involving cattle theft will become a livelihood option among members of local community. These conflicts will further increase vulnerability of the people to shocks and stressors and this will affect their participation in tourism activities.

Depredation is another way that human beings interact with wildlife. Depredation of livestock by lions, leopards and hyenas is very common in NCA (Ikanda &Packer, 2008). This results in loss of both wildlife and livestock. Through depredation livestock numbers are reduced by predators and this exposes people, who depend on livestock, to poverty. It was reported during interviews that human beings can also be attacked, injured or killed by lions when they attempt to protect their livestock from being eaten. But humans can also be attacked suddenly by wild animals, especially when the former is fulfilling his/her normal duties. This reduces the manpower necessary for delivering

tourism services. Some studies have indicated that livestock herders have to protect their livestock from being killed by lions. In so doing, people have to guard their livestock through the night. This practice not only weakens them, due to loss of sleep over night, but also exposes them to mosquitoes and malaria (if at all mosquito are present in NCA). This combined with loss of livestock (as a result of deaths from diseases and droughts) plus theft, increases exposure and the vulnerability of the NCA people to the impacts of climate change. Retaliatory killing of lions and other carnivores by native residents to protect their lives and livestock from depredation is common and may further reduce the lion population. In 2008, Ikanda and Packer (2008) conducted a study to establish a trend of ritual versus retaliation of African lions in the NCA ecosystem between 2001 and 2004. They found that the number of lions killed through retaliation was proportional to the number of cattle depredation by lions.

Furthermore, social and cultural activities (involving ritual ceremonies) are other sources of interaction between humans and wildlife. This interaction is always negative because it involves killing of animals for ritual ceremonies. In NCA and surrounding Maasai lands, lions have mostly been the victims of these ceremonies. It is well known in Tanzania and other Maasai lands in East Africa that for a Maasai boy to pass from the young age to adulthood, and for him to be recognised as an adult and matured person, he has to kill a lion. During data collection for this study (i.e. informal conversation), participants acknowledged that this has to be done by a Maasai boy, who had just undergone circumcision (usually from the age of 12 years). According to the Maasai, traditional beliefs associated with killing a lion by a young Maasai warrants him the status of being recognised as a courageous and strong person, who can defend the tribe, clan or family from cattle theft, predators and other invaders (Spear, cited in Ikanda & Packer, 2008). Although this act has been banned by the governments of Tanzania since the 1970s (Ikanda & Packer, 2008); some Maasai respondents acknowledged that on a few occasions some people still practiced lion killing. Similar findings were also put forward by Ikanda and Packer (2008). Ritual ceremonies also increase the exposure of wildlife to extinction.

Similarly, interactions between humans and wildlife are associated with inbreeding. According to information revealed by some conservationists, there is increased wildlife disturbance due to human activities and this may be the source of inbreeding in lions

and black rhinos. Inbreeding causes a newly born animal to genetic weakness – a condition that is likely to increase its exposure to diseases and other stressors. This also has implications for the decline of wildlife and can significantly impact ecosystems. The discussion with the ecologist revealed that the decline in the lion population in the Ngorongoro crater is associated with diseases accelerated by inbreeding.

Tourism is another encounter between humans and wildlife in NCA that contributes to exposure of NCA to climate change. Factors such as increased tourism development, stress to the animals from vehicle congestion and killing of the animals by tourist vehicles are among the negative consequences of human-wildlife interactions.

Human-plant interactions: Interactions between humans and plants occur when humans use plants for various livelihood purposes (i.e. feeding livestock, traditional medicines, ritual ceremonies, firewood and construction). It was evident from interviewees that over recent years, there has been an increase in the use of medicinal plants for cash because of livestock failure. Traditional medicines are used to cure diseases because they are cheap and easily accessed compared to modern medicines. Another practice involves the deliberate setting of bushfires, by some local community members, to encourage the growth of green pastures for livestock. All these activities can become a source of environmental degradation such as desertification and deforestation. This consequently exposes the land to various climate driven impacts such as soil erosion and runoff and invasion of exotic plants. In addition, these practices may destroy the water catchments resulting in reduced water availability.

Wildlife-wildlife interactions: Interactions between wildlife are sometimes detrimental to their wellbeing. The interviewees mentioned fighting among male rhinos and among male elephants as an example of negative interactions. The conservationists who participated in this research explained that in the Ngorongoro crater male rhinos fight against each other for territory, driven by the need to easily access food and mate. The conservationist explained that the defeated rhino will move out of the crater (to the northern highland forests or to SNP) leading to their decline in the crater. This argument is supported by Fyumagwa and Nyahongo (2010). The conservationist speculated that the decline of male rhinos has resulted in low male to female ratios in the crater, and

this situation can increase the likelihood of inbreeding, and exposure of rhinos to diseases and other stressors.

Depredation is another negative wildlife-wildlife interaction. Depredation involves wildlife killing and feeding on other wildlife. Although depredation is a natural ecosystem activity, it can cause negative impacts on wildlife populations, especially if the ratio of predators to prey is altered. Various factors including climate change can alter this ratio and consequently affect the functioning of the ecosystem. Table 6-3 presents a summary of NCA ecosystem processes and how it influences exposure.

Table 6-3: Summary of ecosystem processes and exposure

Ecosystem functional/interaction processes	What does the process involve?	How does it influence exposure?	Shock/stressors exacerbated under climate change	Immediate Vs future impacts to tourism
Human-human	<ul style="list-style-type: none"> • Competition for resources • Social conflicts 		<ul style="list-style-type: none"> • Biodiversity loss 	Future
	<ul style="list-style-type: none"> • Unequal power sharing 	<ul style="list-style-type: none"> • Involves penalty & fines which reduces the family's economic resources • Social conflicts • Anger • Retaliatory killing of wildlife 	<ul style="list-style-type: none"> • Environmental degradation • Biodiversity loss 	Future
	<ul style="list-style-type: none"> • Population growth 	<ul style="list-style-type: none"> • Overexploitation of natural resources • Increased engagement in illegal activities 	<ul style="list-style-type: none"> • Reduced water availability • Biodiversity loss 	Future
	<ul style="list-style-type: none"> • Cattle theft 	<ul style="list-style-type: none"> • Erodes the family's economic base • Results in food insecurity and malnutrition • Reduces the capacity of the family to cope with increased poverty levels 	<ul style="list-style-type: none"> • Malnutrition increases Vulnerability to diseases • Increase vulnerability to droughts 	Future
	<ul style="list-style-type: none"> • Disease transmission 	<ul style="list-style-type: none"> • Weakens the individual's capacity to participate in tourism activities 	<ul style="list-style-type: none"> • Vulnerability to disease outbreak 	Future
	<ul style="list-style-type: none"> • Increased human activities 	<ul style="list-style-type: none"> • Blockage of wildlife migratory corridors • Overexploitation of natural resources • Increased animal disturbances • Environmental degradation 	<ul style="list-style-type: none"> • Biodiversity and habitat loss 	Future
			<ul style="list-style-type: none"> • Biodiversity loss • Facilitate the invasion of exotic species 	Future
Human-wildlife	<ul style="list-style-type: none"> • Illegal hunting (poaching) • Disease transmission • Cultural beliefs • Activities/ritual ceremonies • Blocking migratory routes 	<ul style="list-style-type: none"> • Human-wildlife conflicts • Disturbance of wildlife • Cause animal stresses • Disturbance of wildlife facilitates inbreeding 	<ul style="list-style-type: none"> • Disease outbreaks • Biodiversity loss 	Future

Human-environment	<ul style="list-style-type: none">• Extraction of materials• Illegal logging	<ul style="list-style-type: none">• Environmental degradation• Deforestation• Desertification• Soil erosion	Future	
	<ul style="list-style-type: none">• Recreation & Tourism	<ul style="list-style-type: none">• Causes congestion of tourist vehicles• Involves off-road driving, destroys vegetation• Causes road kill• Causes dust pollution• Increases animal stress	<ul style="list-style-type: none">• Environmental degradation• Biodiversity and habitat loss• Changes in vegetation• Stressed animals can be susceptible to diseases	Future
	<ul style="list-style-type: none">• Setting of bushfires	<ul style="list-style-type: none">• Dust pollution (low quality forage, reduced range etc.)	<ul style="list-style-type: none">• Desertification• Soil erosion• Droughts	Future
Wildlife-wildlife	<ul style="list-style-type: none">• Depredation• Disease transmission• Fighting for territory	<ul style="list-style-type: none">• Disturbances• Isolation• Inbreeding• Demographic shifts	<ul style="list-style-type: none">• Biodiversity loss• Extinction• Increase vulnerability to disease outbreaks	Future
Wildlife-environment	<ul style="list-style-type: none">• Grazing• Browsing	<ul style="list-style-type: none">• Overgrazing (overfeeding in wetlands during droughts)• Trampling (when feeding in natural spring)• Destruction of forest vegetation by elephants	<ul style="list-style-type: none">• Biodiversity loss• Soil erosion	Future
Livestock-wildlife	<ul style="list-style-type: none">• Depredation• Competition for pastures• Disease transmission	<ul style="list-style-type: none">• Livestock loss – reduces the household/family economic base	<ul style="list-style-type: none">• Biodiversity loss• Increase vulnerability to disease outbreaks	Future
Human-plants	<ul style="list-style-type: none">• Logging• Bushfires• Traditional medicine	<ul style="list-style-type: none">• Leave the land bare• Soil erosion• Desertification• Deforestation	<ul style="list-style-type: none">• Changes in vegetation• Environmental degradation	Future

6.4 Chapter summary

This chapter has presented a range of biophysical factors that accelerate the exposure of species to shocks and stressors. Notably, the human population, landscape/topography characteristics and ecosystem functions featured as the most influential exposure factors for wildlife tourism in NCA. The chapter introduced the ecosystem relationships that can be a source of exposure to climate change. Identification of these factors presents significant knowledge that wildlife tourism practitioners may need when dealing with climate change. Any attempts to reduce exposure can revolve around addressing those factors.

However, as explained previously, exposure is not the only factor that influences vulnerability, but rather it combines with sensitivity and adaptive capacity to influence vulnerability. The following chapter will present the sensitivity factors that accelerate vulnerability of wildlife tourism to climate change.

CHAPTER SEVEN: SYSTEM SENSITIVITY

7.1 Introduction

The purpose of this chapter is to discuss factors that perpetuate sensitivity of the NCA wildlife tourism system to shocks and stressors. The discussion reflects the responses that emerged during in-depth interviews, FGDs and informal conversations. The chapter is an attempt to respond to part two of research objective three (iii) of this study, as shown in table 7-1 below. The chapter begins with a brief explanation of the sensitivity assessment process and key themes used to guide the analysis followed by discussion of the factors that perpetuate the sensitivity of wildlife tourism in NCA.

Table 7-1: Research objective addressed in Chapter 7

Research objective	What information is needed?	How information will be gathered	Why the method is appropriate
3 (iii). To assess the sensitivity of wildlife tourism system to climate change	Identification of the factors that determine the sensitivity of the NCA to shocks and stressors	<ul style="list-style-type: none">• semi-structured interviews• focus group discussions• informal discussions• analysis of secondary data	Helps to understand the context and extent of NCA sensitivities to shocks and stressors

7.2 Sensitivity concept

As highlighted in the literature review, sensitivity is the second determinant of vulnerability (O'Brien et al., 2004). It is the degree to which a tourism system or one of its components is or will be affected by climate shocks and stressors. Sensitivity is greatly influenced by the system's pre-existing social, economic, political and environmental factors (Calgaro et al., 2013a, 2013b; O'Brien et al., 2004; Pelling, 2010). With respect to this study, identifying and analysing these factors presents a way of understanding the sensitivity of the wildlife tourism system to shocks and stressors. Table 7-2 presents examples of sensitivity factors mentioned by participants.

Table 7-2: Sensitivity factors

Sensitivity factors	Some examples of sensitivity factors as mentioned by participants
Tourism specific sensitivities	<p>Tourism seasonality: ‘During high [tourism] seasons we become extremely busy, busy! Busy! but in a few months following the bombing events of [US embassies in] Dar es Salaam and Mombasa we somehow relaxed because there were [a] few tourists coming’ (A tour guide).</p>
	<p>Markets and marketing strategies: ‘You know tourism here depends largely on international tourists from UK and USA, so any threats to these people you would see reduction in their numbers.’ ‘I commend our marketing strategies because we have managed to market the destination all over the world.’ ‘We have managed to market the destination to big markets such as the UK, USA, and South America and now were in China.’ ‘Unfortunately until now we have not managed to capture the highest earning tourist, we are playing with the middle and low income earners, probably there is a problem in addressing what they need.’ ‘We have managed to raise awareness and attracted domestic visitors through cost reduction’.</p>
	<p>Destination positioning: ‘The closeness of NCA with Kenya sometimes increases its vulnerability to any threat occurring on that side.’ ‘This position of NCA is strategically located by God as it attracts almost all tourists coming to visit other attractions in the Northern circuit’. ‘Due to our position the extent of environmental degradation is very high because almost all tourists going to Serengeti will stop here, some people say the number of tourist vehicles has exceeded the carrying capacity of NCA particularly during high seasons. Many day trippers also cross the NCA going to Mara region’.</p>
	<p>Destination image sensitivity: ‘Our image is good in front of international tourists because of the political stability and peace stability in our country, so many tourists will still come even where there is threat warning – they believe in information we give them.’</p>
Access to livelihood assets sensitivities	<p>Economic assets sensitivity</p> <ul style="list-style-type: none"> • ‘Starvation is killing us because we have no money to purchase food. Our children suffer malnutrition because no money to buy food’. • ‘We don’t have access to credits, we can’t establish business even if one of the family <i>members</i> happens to get capital, and we are nothing here’. • ‘... We have the newest set of the basic needs like other Tanzanians ... we need access to extra income generating activities’.
	<p>Human and social assets sensitivity</p> <ul style="list-style-type: none"> • ‘For me to get a new job immediately I need to have greater competence in my current job. For example: I need to be a competent driver; I need to have customer care skills; I need to have wildlife knowledge [in order to be a good interpreter]; [and] I need to establish a network of friends – both employers and fellow drivers’ (Tour driver). • ‘We need to conserve our wildlife for future use. What remains a major challenge is for me to update my knowledge regularly’ (A

	conservationist).
	Physical and environmental assets sensitivity <ul style="list-style-type: none"> • ‘We have no access to land, we are neither allowed to invest into business nor construct modern houses, we are restricted to cultivate crops, we have no access to clean water... we are nothing here... they [the government and conservationists] want us to die we can’t accept this’ (local community).
Governance processes sensitivities	Governing policies, legislations and laws <ul style="list-style-type: none"> • ‘We will continue fighting [against the government] until we get a solution ... we cannot continue leading people who are dying from hunger while resources are plenty’ (Local community).

The themes used to identify, analyse and discuss wildlife tourism sensitivity to shocks and stressors include: tourism specific sensitivities; sensitivities associated with access to livelihood assets; environmental sensitivities; and sensitivities associated with governance processes. However, despite the use of these themes to guide the analysis, it is important to stress that understanding sensitivity factors by just ticking them off a given checklist of themes would not provide sufficient information to understand the destination’s vulnerability. But the assessment of the way these factors combine with other factors to influence vulnerability provides a full understanding of vulnerability and resilience of the studied system (Calgaro et al., 2013a, p.8). This section therefore reports the sensitivity factors and the way they combine to influence the vulnerability or resilience of wildlife tourism.

7.3 Tourism specific sensitivities

Based on the literature review in chapters two and three, the sub-themes used to identify, analyse and discuss tourism specific sensitivities include: tourism seasonality; markets and marketing strategies; destination history and positioning; and destination image sensitivities.

7.3.1 Tourism seasonality

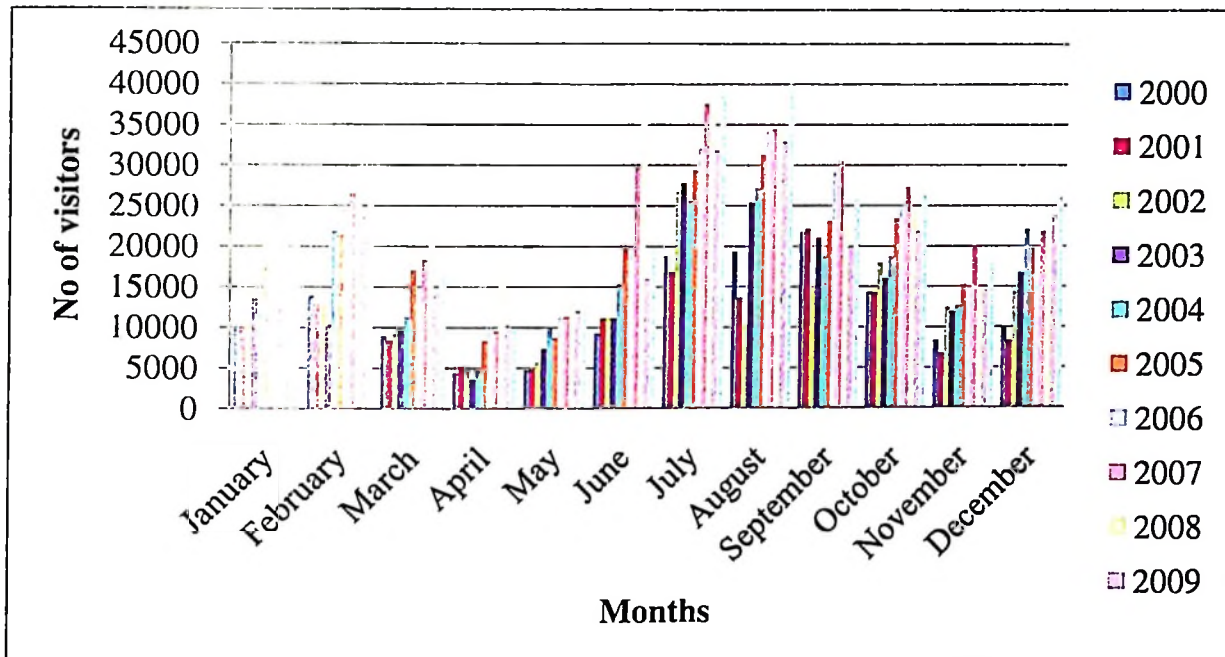
Tourism seasonality has been considered as a factor that can influence the destination’s vulnerability to climate change (Calgaro et al., 2013a 2013b; Mirza, 2003; Scott et al., 2011). This is because tourism and recreation are conditioned by seasonal weather variations occurring at the destination (Moreno & Amelung, 2009). These variations can occur as negative events – shocks and/or stressors. Therefore, it is likely that variations

in seasonal weather or climate may affect the flow of tourists, especially if this variation is associated with tourists' discomfort. Since these variations occur seasonally, the flow of tourists becomes seasonal. This creates periods of high, low or off-season. This in turn may affect the flow of revenue needed by people to respond to shocks and stressors throughout the year. The degree of vulnerability will however depend on the timing of a negative event and people's adaptive capacities. This section discusses how seasonality of tourism in NCA influences the degree of vulnerability to shocks and stressors, and how it may affect businesses, individuals and ecosystems in the future. The discussion also includes the identification of those who were mostly affected.

There are three main tourist seasons in NCA: high, low and off-season. This research found that seasonal weather plays a big role in influencing tourist flow to NCA. However, other factors, such as holiday timing by tourists, may also contribute to tourist flow, although these factors were not subject to this analysis. Figure 7-1 shows that the high tourist season in NCA begins in June and attains its peak somewhere in July and August, and from there it starts to drop away. During this period there is no rainfall but the environment is wet, green and very attractive. The low season begins in September through October and ends in March of the following year. From September to November, most of the NCA sites (particularly the semi arid and arid areas), except NHFR and some parts of the crater (mainly the water marshes), are very dry (particularly arid and semi-arid areas of the western part of the crater). The roads are full of dusts. Tourists still visit the area even though their numbers are low. In December, the low season may sometimes attain the lowest number of tourist because of high rainfall. However, the rainfall in December is unpredictable. Depending on seasonal variations, this rainfall can be very low, thereby permitting tourist activities to continue as usual. The off-season occurs in April and May. According to the interviewees, during this period NCA receives no tourists or very few. Usually, during this period NCA receives heavy/peak rainfall (ranging from 400mm in arid and semi-arid regions to 1700mm in NHFR) and it is not recommended to take safari activities.

Nevertheless, over recent years, an increasing flow of international tourists to NCA occurs even during off-seasons. This research noted that over recent decades the rainfall has decreased during off-seasons, leading to contraction of the low season. This situation suggests that in future, the flow of tourists may continue as usual, if rainfall

continues to decrease. The implication is that reduced rainfall as a result of climate change can be an opportunity for tourism in NCA. However, the flow may attain only a short run because in the long run some of the natural attractions may be affected by droughts and disappear as a result of low rainfall or lack of rainfall. Other factors such as escaping vehicle congestion in the crater during the high season and timing of holidays may have prompted some tourists to organise their travel during the low season.



Source: NCAA meteorological office (2012).

Figure 7-1: Seasonal flow of international visitors to NCA, 2000–2010

This study established that seasonality influences vulnerability when the timing of a negative event (shock or stressor) coincides with high seasons. This is because the event can interrupt the flow of tourists and revenue expected by employees, other community members and/organisations. For example, the August 1998 bombing of US embassies in Tanzania and Kenya occurred during the peak tourism season. Most tourism businesses were affected. Similarly, the 9/11 attack on the USA twin towers and the bombing of the Paradise Hotel in November, 2002 events also affected tourism throughout the East African region, even though they occurred during the low season. Workers with limited livelihoods options were more affected than those with diverse options.

Across the NCA tourism system, this research established that guides or transport companies were more vulnerable to tourism seasonality compared to the accommodation sector and local community. It was noted that during low seasons, most of the guide workers are granted unpaid leave, and during the off-season almost all workers are granted this leave. However, a few of them may still work, depending on tourist flow. Normally, most holiday workers use the income they accumulated during high through low seasons to conduct their livelihoods during the off-season. They use this income to diversify to other small businesses such as retail shops and/or agriculture, which cushions them during the off-season or when the high season is disrupted by a shock. This research found that workers who had just been employed were more vulnerable than long-serving ones.

‘During high [tourism] seasons we become extremely busy, busy! Busy! but in a few months following the bombing events of [US embassies in] Dar es Salaam and Mombasa we were somehow affected [because a] few [number of] tourists come’ (Hotel staff from NCA).

‘Low [or off] season is not good at all because I have to stop my work and do other activities because there are few tourists coming and most of us are given leave until high season come[s]. The situation is even worse when there’s a terrorist event’ (Tour guide).

Another tour guide employee said:

‘Although we are paid salary in our offices, we normally depend on tips [money paid directly by the tourist to the tour guide after offering a service] to get extra cash from tourists, but after the terrorist events of Dar es Salaam and Nairobi, things weren’t good [because a] few tourist were available’ (Tour guide).

7.3.2 Markets and marketing strategies sensitivities

The type of markets and marketing strategies adopted by a destination have been cited as another factor that can influence the destination’s sensitivity and vulnerability to both climatic and non-climatic shocks and stressors (Calgaro et al., 2013a, 2013b). This is because markets and marketing strategies play a central role in influencing the flow of tourists, revenue and consequently the destination’s capacity to cope, respond and adapt to negative impacts (Calgaro, 2011; Calgaro et al., 2013a, 2013b). In NCA, this study found that the sensitivity of this destination to both shocks and stressors can, in addition to other mentioned factors, be influenced by its over-dependence on the international

tourist market and the reliance on wildlife tourism of the Northern Tourist Circuit of Tanzania (NTC). While the former might have influenced the tourism industry's capacity to cope with shocks, the latter might have affected the sensitivity of the destination to various environmental stressors mentioned in the previous chapter.

High dependence on international source markets had a greater influence on the sensitivity of NCA to shock events, such as terrorism and political chaos, as found in this study. The international market currently accounts for over 68% of visitors flowing to NCA. Since 1991 to date the USA, UK, Germany, France and Spain have remained the top five markets, although there are more than 50 other countries whose citizens visit this destination (NCAA, 2011). Over-dependence on a single market, particularly if this dependence involves a single block (i.e. the European market), has a significant adverse effect on tourism, particularly during crises (both in tourist generating and receiving regions). This is because during this period travel tends to decline (URT, 2011). For example, as presented in chapter five, the year 2007 was associated with political chaos in Kenya as the only shock event. Compared to 2006, NCAA reported a decline of visitors from its top five markets as shown in table 7-3. In 2008, there was no reported shock event and the number of tourists increased.

Table 7-3: Visitor arrivals to NCA, 2006 –2008

Year	USA	United Kingdom	Germany	France	Spain
2006	48,870	36,910	25,810	15,640	14,200
2007	34,912	33,119 (10%)	11,928	14,770	9,509
2008	63,609	46,678	26,257	22,284	10,589

Source: NCAA (2011).

Tanzania's current tourism market strategy has tended to concentrate on promoting NTC, regardless of the presence of a variety of tourism packages in other parts of the country. Massive promotion of tourism in NTC makes it the most popular and most visited tourist destination in Tanzania. While in the short and medium term, this has had a positive impact in terms of tourists and revenue flowing to this area, in the long term this strategy can have adverse impacts on wildlife tourism, due to its negative impacts on environmental resources critical for wildlife tourism. Recent studies have reported that over 80% of tourists visiting Tanzania spend their time in NTC (Okello & Yerian, 2009); and according to the 2010 visitor data recorded over 50% visited NCA. Charnley

(2005) reported that over 40% of all annual international visitors to Tanzania exclusively visit NCA. The adoption of marketing strategies that tend to over-market wildlife tourism in NTC increases the sensitivity of NCA to environmental and habitat degradation, as a result of increased tourist and vehicle influx beyond the carrying capacity of the area. This situation can exacerbate the area's vulnerability to climate change.

There are various reasons, provided by respondents, for over-marketing NTC: attractions are easily accessible compared to other places in the country and wildlife is located in close proximity to where tourists can explore them in as short a period as possible (Okello & Yerian, 2009); and NTC has well developed infrastructures and accommodation facilities (NCAA, 2010). These factors, together with its location, make NTC the most visited part of Tanzania. This in turn makes it the most sensitive area to environmental degradation and animal disturbances, all of which can have negative consequences for future tourism under climate change.

Current marketing strategies indicate that NTC will still be the targeted area for tourists coming to Tanzania. For example, in November 2012, the Tanzania Tourist Board (TTB) launched a five-year international tourism marketing strategy with twelve goals. Among them were: raising the current position of the Tanzania mainland from 90th to 75th in world travel and tourism; and increasing its market share from 11% to 14% (Tanzania Tourist Board, 2012, www.eturbonews.com). The strategy aims to envision Tanzania increasing: the international tourist flow from 867,994 tourists (achieved in 2011) to 2.0 million tourists in 2017; and revenues from the current US\$1.35 billion to US\$2.0 billion, under assumptions that the existing economic situation will prevail or improve (www.etn.com). The strategy maintains that to achieve these goals it needs to focus on marketing to existing markets with existing tourism products. This suggests that NTC will have to accommodate the forecasted increase in tourist flows. In addition, it will have to depend on the same international markets.

The strategy strives to retain the top four primary source markets (i.e. the UK, the USA, Germany and Italy) while attracting more of their people to visit Tanzania. This does not however mean that efforts to attracting other emerging markets to visit the country will stop. Given that little effort has been made to diversify tourism product in Tanzania and the fact that most tourists (over 80%) visiting Tanzania spend their time in NTC

(Okello & Yerian, 2009), wildlife tourism will continue to be the main tool for achieving the goal of an increased number of tourists in the next five years. This has greater implications for wildlife habitat sensitivity.

Although diversification to other tourist circuits and other tourism forms (such as beach and cultural tourism) is mentioned in the current Tanzania's tourism marketing strategy as a means to reduce congestion of tourists in NCA, the notion that over-marketing of NTC will prevail can arguably be justified for a number of reasons. First, TTB acknowledged in its marketing strategy that it is under-budgeted. This raises the question as to whether TTB will manage to achieve the intended diversification and direct emerging tourists to other circuits. Even in the 2013/14 annual budget of the MNRT, the issue of developing other national tourist circuits to enable them accommodate the expected tourist influx, is not clearly stated. Second, TTB on its website, www.tanzania-touristboard.com (accessed 10/05/2013), has continued to promote the top ten best destinations in Tanzania, of these, six destinations are located in NTC (see table 7-4). Third, there are about 400 registered tour operators in Tanzania. More than 70% of these companies are located and operate in NTC, meaning that the expectation of tourists receiving high quality service will be fulfilled by the services provided in NTC. The general implication is that NTC will still be a major destination for future tourists. Given that most tourists going to NTC visit NCA, this will increase the sensitivity of the area to various negative impacts and consequently affect future wildlife tourism.

Table 7-4: Tanzania's top ten destinations and main tourism product

	Destination	Location	Main tourism product
1	Ngorongoro Conservation Area	Northern Circuit	Wildlife
2	Serengeti National Park	Northern Circuit	Wildlife
3	Zanzibar	Zanzibar	Beach
4	Tarangire National Park	Northern Circuit	Wildlife
5	Lake Manyara National Park	Northern Circuit	Wildlife
6	Mt. Kilimanjaro National Park	Northern Circuit	Mountain climbing
7	Selous Game Reserve	Southern Circuit	Wildlife
8	Ruaha National Park	Southern Circuit	Wildlife
9	Mafia Island	Southern Circuit	Beach
10	Mt. Meru	Northern Circuit	Mountain climbing

7.3.3 Destination location

NCA is located in the northern part of Tanzania. Being close to Kenya, NCA benefits from visitors who wish to cross the border from Kenya, but spill over effects incurring negative impacts may occur in Kenya. Similarly, NCA is the main gateway to SNP and Mara region. Therefore the area receives many visitors, some of whom were not intending to visit. Hence, there are many people and cars passing through this area every day. All these impacts can increase NCA's sensitivity to the various factors mentioned above including road kill by passing vehicles. All these combined with climate variability and change may increase the vulnerability of wildlife tourism in future.

7.4 Environmental sensitivities

This research established that climate change can affect the timing of major seasonal wildlife activities, such as migration and breeding, which are major adventures that attract tourists and draw them from their usual residencies. This in turn can affect the flow of tourists who are interested in these activities. This study noted that annual migrations of wildebeests, zebras and gazelles plus the breeding of wildebeests are examples of seasonal wildlife adventures that draw some tourists from source markets to visit NCA and SNP (Gereta, 2010). Usually, these animals migrate annually to and from NCA and SNP through the Masai Mara National Reserve (MMNR). Animals migrate when important elements for survival in their usual habitat are lacking (Ndibalem, 2010). Food, water, favourable weather and climate and a safe environment are examples of such elements. The implication is that if there is any stressor that would potentially affect seasonal wildlife activities (i.e. phenology), it may also affect the flow of tourists who are interested in these activities. A senior NCA conservationist and one tour guide commented:

‘Seasonal variations along the ecosystems determine where the migrants will feed, drink or calve. Thus, any environmental stress that may deter the timing of this important activity will have significant impacts on tourism’ (Senior conservationist, 9/3/2013).

‘Changed patterns of seasonal wildlife activities may affect the flow of tourists who are interested in those activities (Tour guide, 12/3/2012).’

Discussion with park managers, tour guides and some local community members indicated that significant changes in migration patterns of wildebeest have occurred in

recent years. Although this research did not establish any effect of these changes on tourism takings, these changes will no doubt affect tourism profit margins in future. Therefore, it is worth discussing migration patterns to include them in developing adaptation interventions. The participants explained that usually migrating animals exhibit a circular pattern with distinct and well-defined routes (see figure 7-1). That is, migrating animals will, in most cases, take the western route on their way from the Ngorongoro crater to the MMNR (via SNP, IGCA and GGCA) and take the eastern route on their way back. A cycle will begin at the crater and complete when the animals return to the crater for calving. However, not all animals will complete the cycle because of depredation and other encounters such as poaching and/or environmental conditions. According to a tour guide who participated in discussion, animals have tended to return using the same route they used on their way to Serengeti, something which many participants considered unusual. He said:

‘Animals tend to take a round route during their migration, this year they have returned via the same way. They left through the western corridor and they used the same corridor to return home ... this is unusual’.

With regard to what had caused these changes, participants had different opinions. Whereas the majority associated this with climate change, others associated it with other stressors such as changes in vegetation or increased human activities. Nevertheless, the tour guide acknowledged there has been no critical research conducted to verify these opinions. This is an area that needs further research. However, some participants considered the observed changes as consistent with normal seasonal variations. One conservationist said:

‘Seasonal variations are always there and wild animals have their own ways of adapting to these variations such as changing behaviours ... so, you cannot relate these variations with climate change.’

Further changes in seasonal migrations patterns of wildebeest were observed in 2012 and reported by local media. According to these reports, unusual migratory patterns were observed in 2012. The wildebeest spent only three weeks in Masai Mara National Park before returning to SNP instead of the usual two or more months (*The Guardian*, 2012). According to tour operators, if these changes continue it may affect tourist flow because program calendars will have changed to fit the new situation.

'Since it has happened for the first time this year [2012], we may have to wait until 2013 to see if the same pattern repeats, then we as tour operators will have to change our programme calendars and fliers to inform the entire world that the Serengeti Migration times and pattern has changed' (*The Guardian*, September, 2012).

The tour guides also supported this by adding:

'It was not usual for these animals to spend such a short period in Masai Mara' (Tour guide, 2012).

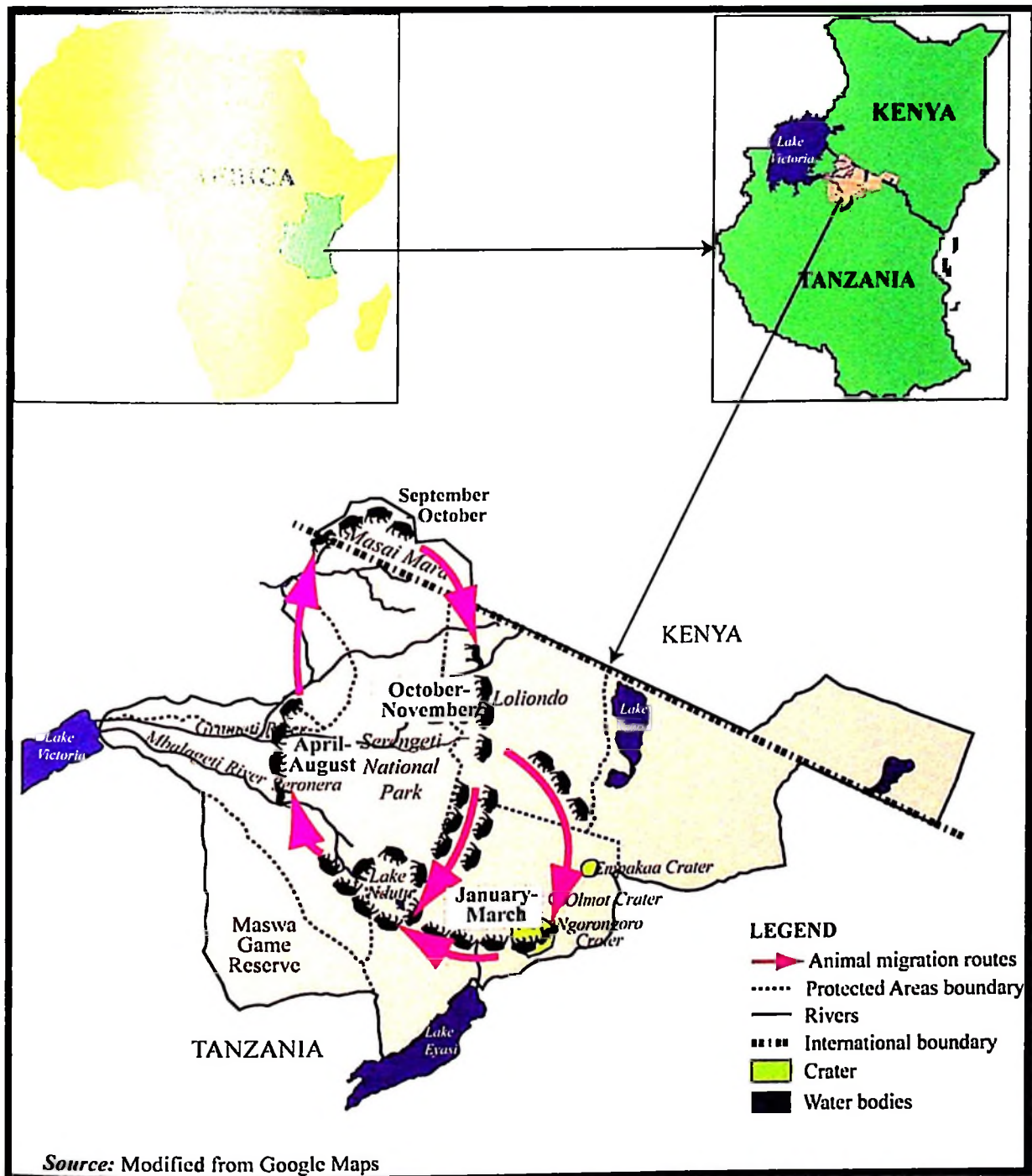


Figure 7-2: Wildlife migratory routes in Serengeti-Mara ecosystem

Both the guides and the park managers perceive these changes are caused by increased human activities, especially on the Kenyan side of the border. However, climate change may also have exacerbated the conditions resulting from increased human activities.

A shift in calving patterns of wildebeests due to seasonal weather changes was reported by the interviewees. According to the tour guides, normally calving takes place in the Ngorongoro crater and Lake Ndutu midway through the short dry season (January to February). One of the interviewed senior NCA authorities estimated that about 350,000 wildebeest calves are born every year in Ngorongoro crater and tourists are interested in this event. Surprisingly, in March 2011 and 2012, there was neither migratory wildlife nor calves in the crater. In March 2011 and 2012, the researcher visited the crater with an experienced guide from NCAA and observed rare calving of wildebeests. Some participants said 'migratory wildebeests were yet to arrive'. Commenting on this shift, the tour guide said:

'During this period we normally see a large number of wildebeests with their newly born calves here but as you can see [only] a few of them are present, [and] they are non-migratory...migrants [sic] are not yet here... it is unusual'.

Following this explanation, a probing question was asked to the tour guide as to why this situation had happened. The tour guide commented:

'... it can be due to lack of rain, especially during the short rain season which normally takes place in this period, you could see this area full of green grasses, full of wildlife, but do you see them? It is dry everywhere; what do you think if there is no food here? They have to remain elsewhere'.

It can be argued, from this explanation, that lack of rainfall and associated droughts have caused calving of wildebeests to occur away from their usual calving areas. However, this research did not establish any shift in tourist flow due to these changes. Nevertheless, it is important to note that under severe predicted climate change this situation will continue and may affect wildlife tourism.

In discussion with some conservation employees it was revealed that significant environmental degradation has occurred as a result of increased numbers of tourists interested in camping in the jungle. According to these participants the promotion of

wildlife tourism in NTC in the last ten years has seen an increasing number of tourists coming to NCA, beyond the current capacity of lodges/hotels to accommodate them. As a result, surplus tourists have stayed in luxury campsites constructed in the jungle. Participants reported that initially the number of tourists opting for campsites was compatible with environmental requirements. But over recent years the jungle wildlife has attracted many tourists to opt for campsites. Increased interest in campsites among international visitors is attributed to increasing environmental awareness and a desire to learn more about nature, especially to experience camping in the jungle. According to one participant:

‘Tourists want to feel the true nature; they want to hear the sounds of wild animals during the night... they would like to gather around the fire outside the campsite during the night... generally they want to feel something different from their usual life ... these aspects of nature are not available in lodges’.

According to a senior NCA conservationist, this is creating conservation and management challenges in the area.

‘Increased demand for campsites has caused significant impacts on infrastructure development, resource utilisation and environmental conservation’.

According to this participant, the capacity of NCAA to fulfil the demand for luxury campsites is low. This is aggravated by the requirement to maintain the integrity of NCA’s natural environment.

‘Increased number of campsites [in NCA] increases utilisation of resources, particularly water, and also the campsites increase environmental degradation which, in turn, will need to be restored at higher costs’.

In addition, discussion with tour guides also revealed that campsites become a source of degradation and disturb the animals, because they have to be constructed where wildlife can be easily accessed. In this case, most campsites are built along the migratory routes or at permanent waterholes (e.g. Lake Ndutu) where migrating animals stop regularly. This creates environmental degradation as well as animal stress. For example, discussion with some tour guides/drivers indicated that increased numbers of campsites located in Lake Ndutu together with a large number of tourist vehicles significantly

stresses wild animals and the environment and also disturbs their migration. Similarly, discussion with conservationists revealed that this situation can have significant effects on breeding patterns and increase exposure to predators, diseases and other climatic stressors. Congestion of cars around the campsite increases environmental degradation, especially soil erosion and destruction of native vegetation species. The vehicles are also associated with introducing invasive plant species in campsites.

Similarly, discussion with lodge/hotel managers revealed that increased demand for campsites reduces the demand for rooms in lodges/hotels, since the owners of campsites are not necessarily the owners of lodges/hotels. Reduced demand for hotels/lodges, especially during the low season, can cause reduced revenue and increases their vulnerability to shocks and stressors.

7.5 Human sensitivities: Access to livelihood assets

Vulnerability or resilience of humans depends on how their livelihoods enable them to resist shocks and stressors (Cannon, 2008 p. 4). People's vulnerability is caused by lack of access to livelihood assets/resources. This study revealed that wildlife tourism may become vulnerable if stakeholders (especially those responsible for provisioning tourism services) are vulnerable to the impacts of climate change. This finding suggests that the resilience of wildlife tourism depends partly on the resilience of stakeholders and wildlife resources. However, this resilience depends on how underlying livelihood strategies provide them with sufficient income and other basic needs necessary enable them to resist shocks and stressors (Cannon, 2008). This is greatly influenced by people's access and entitlement to livelihood assets (Calgaro et al, 2013a, 2013b; Cannon, 2008). Access to livelihood assets enables people to subsist (Cannon, 2008) and to diversify their livelihood strategies prior to the onset of negative impacts (Calgaro, 2011).

However, people's access and entitlement to livelihood assets is greatly influenced by underlying governance structures and processes. These influence how income and assets are distributed and strengthens people's livelihoods so they can better resist negative events (Cannon, 2008). Therefore, assessing the sensitivity of wildlife tourism involves 'exploring the political economy of resource access, entitlement, distribution and use prior to the onset of climate shocks and/or stressors' (Calgaro et al., 2013b, p.9).

Individuals, households and communities use livelihood assets to adjust to their environment and plan their daily lives. Access to livelihood assets plays an essential role in shaping the strategies that individuals, households or communities use to cope with and/or adapt to shocks and stressors. Those with better resources stand a better chance to resist shocks and/or stressors than those with limited resources (Calgaro, 2011; Calgaro et al., 2013a, 2013b). Access to livelihood assets for wildlife tourism not only provides safety nets for communities to cope with adversity, but also provides incentives to conserve wildlife tourism resources.

This study noted that a broad range of livelihood assets is required by these people to reduce their dependence on natural resources critical for wildlife tourism. Based on the WTVAF model, these assets are classified as economic, human and social, and physical and environmental capital. The contribution of these assets in influencing resilience or sensitivity of the studied communities in NCA is discussed below.

7.5.1 Access to economic capital

Access to economic capital is considered the most important factor that influences the abilities of individuals, households and/or communities in the tourism system to cope with or withstand negative impacts (ILO, cited in Calgaro et al., 2013a; Lipman et al., 2012). Generally, vulnerability occurs when those faced with shocks and/or stressors are deprived of economic assets (Calgaro, 2010). Economic assets enable individuals, communities and institutions to create income and jobs, thereby increasing their capability to diversify their livelihoods (Calgaro, 2011). Access to economic capital by individuals, households and/or communities is influenced by many factors including: the type of enterprise and employment opportunities; access to liquid and fixed assets; and access to credit institutions (Calgaro, 2011). These in turn are shaped by the strengths of underlying social networks; prevailing institutional structures; prevailing governance processes; types and levels of education; and access to technology and markets (IPCC, 2007a). In addition, the availability of insurance cover is important to provide welfare safety nets in times of unemployment, or when an individual or household faces severe property damage. Findings from this study support all of these assertions.

This study revealed that across the NCA tourism system there were people affected by shocks and stressors due to lack of economic capital. Local community members were more affected than other actors. A lack of access to economic capital prevents them from diversifying their livelihood strategies. This community have historically depended on pastoralism (livestock production) as their major source of livelihood (Melita & Mendlinger, 2013). Pastoralism has been a principal employer and a major source of income for this community. According to Melita and Mendlinger (2013), until the 1980s, the ratio of livestock per person was 12:1 for cattle and 18:1 for goats and sheep. This enabled communities to have enough food and income throughout the year. Traditionally, the major part of this food came from meat, milk and blood. Selling livestock is important to obtain the cash needed to buy grains and other basic commodities.

However, since the 1980s significant climatic changes have occurred and livestock no longer constitute reliable economic capital. Livestock production has been affected by severe droughts and diseases. These, together with depredation from lions, hyenas and leopards, have reduced the ratio of livestock per person to 2:1 for cattle and 6:1 for goats and sheep (Melita & Mendlinger, 2013). Consequently, livestock cannot contribute sufficiently to food and income security. As a result, the capacity of Maasai people to deal with the impacts caused by severe droughts has been disrupted. That is why people become vulnerable to severe droughts. The following issues were raised by some Maasai people during FGDs.

‘Starvation is killing us because we have no money to purchase food. Our children suffer malnutrition because no money to buy food’.

‘We don’t have access to credits, we can’t establish business even if one of the family members happens to get capital ... we are nothing here’.

‘... Our lifestyles have changed [due to climate change]. We have the newest set of the basic needs like other Tanzanians ... we need access to extra income generating activities’.

The government of Tanzania in 1992 deliberately allowed diversification to small scale cultivation in NCA to increase the economic base of local community (Melita, 2013). During group discussions, participants were of the opinion that small scale cultivation had become the most reliable alternative solution to dwindling livestock production.

Crop harvests were considered enough for food and cash throughout the year. However, crop cultivation in NCA was associated with many conservation concerns including encroachment of wildlife migratory routes (UNESCO, 2010), wildlife disturbances and retaliatory killing of wildlife in an attempt to prevent them from eating crops (Ikanda & Packer, 2008). As a result, cultivation was considered to be incompatible with conservation and in 1998 the government imposed a ban on crop cultivation. Due to this, many people from this community have continued to suffer from poverty, thereby increasing their sensitivity to climate change variability.

Likewise, the government of Tanzania each year provides subsistence food to assist the local people to cope with the impacts of droughts. However, it was reported during FGDs that the distribution of food is associated with many problems including significant delivery bureaucracy, to the extent that many beneficiaries do not access it. And sometimes access comes too late and starvation has already taken its toll, resulting in deaths. As a result, many participants considered food provision by the government as an unsustainable solution, because it has failed and has not offset droughts.

Currently, tourism represents another important source of economic capital for the NCA's local community. Tourism is considered, by various stakeholders, as an alternative source of economic capital for the NCA local community to supplement dwindling livestock. There are two ways through which the Maasai people participate in tourism. First, direct participation by dancing before tourists, by providing private tour guides for trekking, by posing for photography with tourists, by selling handcrafts, and through employment in hotels and tour operating companies. Second, NCAA subsidies are provided in cash. For example in 2008, about US\$1.5 million (6.5%) of the income collected by NCAA was directed to local community development (Melita & Mendlinger, 2013). However, the findings from this study showed that most of these people perceive they are not adequately benefiting from these funds. Although they realise the benefits of tourism, the income from tourism is not adequate to recover losses caused by the death of livestock. As a result Maasai people have continued to suffer from severe droughts.

According to the interviewees, vulnerability of wildlife tourism may occur if affected communities decide to utilise resources critical for the integrity of the environment and ecosystem as sources of economic capital. Similarly, vulnerability may occur if climate

change affects people's capability to provide tourism services. For example, in this research it was observed that many Maasai women walk long distances to fetch water. As a result, their participation in tourism is affected. This research also found that some community members did not participate in cultural tourism events because of starvation. Many respondents asked these questions:

'How can I dance [before tourists] if I am hungry, I can't? ... How can I participate in tourism while I am attending my child who is dying from hunger?'

A lack of participation in tourism by these people can increase their vulnerability to adverse climatic effects, which in turn affects wildlife tourism.

7.5.2 Access to human and social capital

Human and social capital is an asset people need for coping with negative impacts to reduce their sensitivity to climate change. Individuals or communities with these assets stand a better chance of being less sensitive than those without them. According to Calgaro et al. (2013a), human and social capital includes all aspects related to knowledge and skills, information on risks, labour capacities, and kinship networks and groups. However, in assessing these aspects, this study established that knowledge and skills can influence people's access to information on risks as well as labour capacities. As such, the discussion presented herein considers access to knowledge and skills, and access to kinship networks and groups as major influential human and social capital.

Access to knowledge and skills

Knowledge constitutes a very important human and social capital (Calgaro et al., 2013a). It equips community members with skills needed to withstand shocks and stressors. Both traditional/indigenous and acquired/modern knowledge are important to enhance skills and capacities necessary to enable people to prepare for and cope with shocks and stressors (Calgaro, et al., 2013a, 2013b). Skills and capacities are shaped by types and levels of knowledge. High skill levels enable greater employment flexibility for individuals whose current jobs have been or might be interrupted (Calgaro, 2011). Greater knowledge and skill levels not only increase the individuals' capability to diversify their livelihood strategies but also enhance their capacity to respond positively to adverse situations (Calgaro, 2011).

This study found that in wildlife tourism, access to knowledge about climate changes would enable tourism actors to anticipate, prepare action plans for and/or cope with these changes. Knowledge increases people's capacity to respond, and therefore reduces their sensitivity as well as vulnerability. In the tourism industry, knowledge about travel trends is also important, as it influences preparedness levels for those engaged in transportation services (Calgaro, 2011). In this research, the assessment of how tourism businesses (accommodation and transport providers), park managers and local community access knowledge and skills was undertaken, as discussed in the following subsections.

Access to knowledge and skills by accommodation and transport providers

Findings from this study showed that across the NCA tourism system, most participants involved in accommodation and transport (tour guides) were not highly sensitive to climate change because they had access to knowledge and necessary skills for coping with adversities. This is because most of them consider tourism jobs as unreliable and therefore they can use this awareness to prepare for any job interruption. Most of them consider knowledge of business diversification as a key asset that enables them to diversify their livelihood strategies. One driver during interview said:

'Usually, the success in establishing a private business which becomes source of temporary or permanent employment in times when the current job is interrupted depends partly on business knowledge as well as the amount of capital'.

Engaging in business is considered by these people as temporary employment when one is looking for a new job. But it may become a permanent position, if one loses their current job. One hotel employee said:

'I like my current job but I am aware that it is not predictable and, because of this, I have to prepare for any job termination by establishing my own business at my home area or elsewhere. This becomes my employer in case this [job] terminates for any reason' (Hotel employee).

Most accommodation and transport employees considered entrepreneurship as the most important knowledge/skill required to enhance capacity to conduct business. Some of the participants have ambitions to establish their own accommodation facilities or tour guide companies.

Similarly, these employees know they need to retain their jobs or acquire new ones, so they strive to update their knowledge regularly in order to maintain the competency required to retain their jobs or attain new ones. The interviewees felt that greater skills and competency would enable them to get a new job immediately. However, this is only likely if the impact that caused job interruption had not spread throughout the rest of the country. As a result, the quest for new knowledge becomes a continuous endeavour for these employees. One tour guide/driver said:

‘For me to get a new job immediately I need to have greater competence in my current job. For example: I need to be a good driver; I need to have customer care skills; I need to have wildlife knowledge [in order to be a good interpreter]; [and] I need to establish a network of friends – both employers and fellow drivers’.

However, despite their awareness, some employees of tour guide companies still become the victims of shocks because they have no access to knowledge sources. These are mostly newly employed workers, especially graduates. Most of them lack income and skills needed to establish business or acquire new knowledge. While most accommodation employees frequently received on-the-job training, sponsored by their employers, tour guides rarely received these opportunities.

Access to knowledge and skills by conservationists

Conservation employees seemed to face no job interruption from identified shocks. This is because their employment is secure and backed by the government. Most of them opined that conservation is a continuous process. That is, even if tourism may be at risk, the government will still use funds from other sources to finance conservation. What they considered as important is to have the necessary skills, experience and greater competence in order to retain their jobs.

‘I consider tourism as a very important source of revenue for conservation [of natural resources] in Ngorongoro. But even if tourism gets shocked the government will still retain my job because conservation is a continuous process. We need to conserve our wildlife for future use. What remains a major challenge is for me to update my knowledge regularly’ (Junior conservationist).

‘I thank the government because I have attended several short courses to improve my knowledge’ (Junior conservationist).

For the accommodation and transport providers, searching for new knowledge remains the task of employees, while conservationists capitalise on government sponsored training opportunities. Hence conservationists have greater access to knowledge and skills than tourism business operators. This makes conservationists resilient or less vulnerable to impacts than accommodation and transport employees.

Access to knowledge and skills by local community

People who participated in group discussions indicated that the occurrence of severe droughts is not a new thing in NCA. However, historically the NCA local community have been using traditional knowledge to forecast, increase their preparedness and deal successfully with the consequences of droughts (i.e. autonomous adaptation). Some respondents said this was possible because severe droughts occurred on a regular basis and they were less frequent. Even where it had severe impacts, selling of livestock offered sufficient income to purchase a store of grain for consumption during severe droughts. However, since the 1990s droughts have been occurring in a way that has disrupted the use of traditional knowledge in forecasting such events. The occurrence is irregular, more intense and lasts for a longer duration. Group participants indicated that current droughts rob the soil moisture more quickly and they become dry. Some local community members believe they are vulnerable to droughts because most local community lack the knowledge of global environmental changes.

‘The government has failed to give us sufficient support [during severe droughts]. Even to educate us on environmental changes has been a problem’. Instead they restrict us to graze in the NHFR and crater. How can this reduce the death of our livestock [from droughts]?’ (Participant from Kakesio village).

This study noted that most of these people, as mentioned previously, were aware of climate change but they lacked the knowledge of how to deal with the consequences including preparedness. For example, the study noted that in NCA there were no programs purposely designed to improve local community’s capacity to anticipate climate change. Most community participants believed their vulnerability could be reduced if the government equipped them with the necessary capacity to withstand droughts.

‘I have heard about changes in climate and we can see its impacts on our livestock. But since these changes have occurred, we are left to deal with it by own knowledge. No education offered by the government’.

Local community members are aware that livelihood diversification is one of the most effective means to improve capacity. Establishment of private business enterprises and securing formal employment in accommodation facilities and government institutions were the most frequently mentioned diversification options during group discussions. However, local community lack both the necessary skills to diversify their livelihoods and language skills to enable employment in hotels/lodges. The discussions showed that to establish businesses local communities needed business skills and land entitlement. They voiced their opinions that a lack of all these advantages limited them from diversifying their livelihood strategies. As a result, they have become more vulnerable to the consequences of severe droughts.

‘Those in formal employment have access to business education. We local people have no access to it. But even if I get it where can I apply it: I do not own land, I have no capital. But it can be good for our children’.

However, local community has been experiencing social discrimination from formal employers in the accommodation sector. These employers view them as ‘unreliable’ because they value their livestock over formal employment (Swanson, 2007). FGD members pointed out that this discrimination has continued to date, where livestock is no longer considered a major enterprise. This limits them from accessing employment in the nearby hotels/lodges and consequently they lack economic capability to respond to adversity.

‘I don’t speak English but I know that there are jobs [like security guard and cleaning] that do not need language skills, they don’t employ us even in these jobs’.

Access to kinship networks and groups

Access to kinship (social) networks and groups plays a big role in promoting cohesion, connectedness, reassurance and mutual support among community members (Calgaro et al., 2013a). This study noted that because very often community members do not experience the same level of vulnerability, access to kinship networks and groups enables the distribution of resources from least affected to most affected individuals. By doing so, the capacity of those who are most affected to cope with adversity improves

through sharing of resources. Depending on the norms of the particular community, this is facilitated by terms and conditions agreed among members of that community. However, this study found that the effectiveness of social networks and groups to reduce the vulnerability of people was clearly acknowledged the most by local community. Thus the discussion of this aspect focuses on local community.

This study noted that in NCA there are vertical and horizontal social cohesions. Horizontal social cohesions involve social relations among community individuals sharing some common characteristics. Vertical social cohesions involve how the community is connected to the government(s). This study established that while horizontal social cohesions are substantial, vertical social cohesions are weak among local community members. That is, the interconnectedness between local community and government institutions (mainly NCAA) as well as private institutions does not guarantees immediate assistance to affected community members. Similarly, this research found that Maasai face social marginalisation from government as it is in tourism businesses. Like in tourism businesses, some government employees were heard, during the interviews, saying Maasai are 'unreliable' people in respect of formal employment. The government interviewees provided as similar reason as that provided by the tourism business owners, that 'Maasai values livestock and traditional lifestyle than modern one. As such, it is difficult to employ them.

This study found that Maasai culture is strongly grounded on the values that permit sharing of resources among themselves (horizontal social cohesions). For this community, this has been a very strong coping response during adverse situations. Resource sharing is facilitated by the belief that all natural resources, including food, water and pasture, belong to all Maasai and everybody in this society must have an equal share of and access to them. This is embedded within the dominant belief that nature is an integral part of the Maasai tribe and that god manifests within the tribe through natural resources (Swanson, 2007). This belief is a major reason for the Maasai to co-exist with wild animals without harming them. There are traditional guidelines on how resources can be shared among members of the Maasai community. Maasai elders are responsible for reinforcing these guidelines through intensive communication. The main resources that Maasai have traditionally considered very important for sharing to enhance their livelihoods include food, water and pasture.

Traditionally the shared food for the Maasai has mainly involved livestock products including meat, milk and blood. Food sharing occurs when one family or household faces serious food shortages due to various factors including seasonal climate variations. Traditionally, this sharing was achieved by borrowing live animals, mainly cattle, sheep and/or goats. The borrower is restricted to use a borrowed animal for milk only, and in future these animals are returned to their owner. However, in some agreed terms (common to the whole Maasai community), the borrower can retain some of the offspring from borrowed livestock to enable him to establish a capital of resource.

However, this research noted significant change in the lifestyle of the Maasai over the past 20 years. To date social networks are not as strong as they used to be and food sharing culture is deteriorating. One member of the Maasai society raised the following issue during informal conversation:

‘Although to date food sharing is still common among members of our society it is characterised by very weak ties and there is fear that in future this will disappear completely. In fact, most Maasai believe that this strategy has already disappeared and now everybody is struggling alone’.

The major reasons for this deterioration are associated with global environmental and economic changes that affect the Maasai society. For instance, because of dwindling livestock economies due to climate change, Maasai are forced to shift from traditional lifestyles, determined primarily by livestock sharing and barter trade, to modern lifestyles determined by the market economy. In a market economy, money is a major factor determining access to resources. This mode of economy forces Maasai to abandon their traditional life, characterised by resource sharing, to a more or less selfish lifestyle. This is because traditionally when the economy is dominated by barter trade it was easy to share livestock and/or its products but as the money economy dominates it is difficult to share money. Traditionally, food sharing was a kind of insurance where a person who became a lender could become a borrower in future because of inherent life uncertainties. However, as mentioned during FGDs, Maasai women are still engaging in food sharing, although the practice is not as strong as it was in past years.

Pasture and water are other resources commonly shared among the Maasai. According to Maasai beliefs these resources are freely given by god and they must be shared freely.

However this does not limit one person to ownership. There are customary rights where certain clans are allowed to have primary ownership of water or forage areas. Other members of the society are allowed to utilise these resources, but they are treated as secondary users and do not have direct access to these resources. This kind of resource ownership is instituted in the Maasai community because although water and pasture are freely given resources, they are scarce and therefore ownership by individuals becomes a means to ensure careful utilisation. This study established that the culture of sharing water and forage is still strong, although sometimes it cannot be used to increase resilience, since under severe droughts pastures can dry out everywhere.

7.5.3 Access to physical and environmental resources

The usage patterns of natural resources in most of the protected areas are often associated with restrictions. These restrictions are imposed by the government to ensure that the impacts of human activities on the use of natural resources in protected areas are kept to minimum acceptable levels. To achieve this aim, communities are excluded from using certain natural resources which could be useful to cope with adverse situations. Restrictions increase vulnerability of people that mainly use the ecosystem resources to survive. In NCA, these are often local community members.

Communities may become vulnerable to shocks and/or stressors if the environment within which they pursue their daily activities lacks a well-functioning life support system (Calgaro et al., 2013a; Nelson et al., 2007). Among the key factors for communities to withstand negative impacts is to have access to environmental and physical assets including natural resources, infrastructures and well-functioning communication systems (Calgaro et al., 2013a). This ensures communities have enough resources for the production of goods and services and that they are well connected to markets.

As stated in chapter five, the main goal of NCA's management is to maintain a situation where tourism, conservation, and community development are promoted in a balanced manner. However, in an attempt to achieve this goal significant challenges have emerged. This goal was set when the capacity of the ecosystem to supply necessary activities was high. Nevertheless, as shown in section 6.3.1, significant changes over the

past 40 years (Estes, 2006), among most local community members, have occurred and new community needs have emerged. The capacity of the ecosystem to meet these needs is inadequate. As a result, some of the restrictive measures imposed to achieve a balanced state are now perceived by local community as a violation of human rights. These complaints may become sources of conflict that may in turn cause environmental damage and exposure of wildlife to various stressors.

Discussions with local community members showed that frequent conflicts between local community, conservationists and/or investors over the use of natural resources (e.g. land, water, and pasture) have occurred and may continue to occur. Lack of land tenure and lack of voice by Maasai in decision making – particularly on matters involving the use of natural resources – are the main cause of these conflicts. Moreover, in most villages, respondents reported that existing land tenures deny them an opportunity to diversify their economic activities to meet these new demands. One resident from Moklal village said:

‘our lifestyles have changed, we are no longer eating meat and milk as our only food, we have the newest set of the basic needs like other Tanzanian... our livestock are dying from droughts... we have no hope...’.

Another participant commented:

‘We have no access to land, we are neither allowed to invest into business nor construct modern houses, we are restricted to cultivate crops, we have no access to clean water... we are nothing here... they [the government and conservationists] want us to die we can’t accept this’.

Restriction in an environment, where new community needs continue to arise, can become a source of exposure to various stressors. For example diseases, starvation/hunger and malnutrition (reported in chapter five) are caused by the failure of the ecosystem to supply new community needs, such as food and medicines, due to restrictions. The consequence of hunger/starvation among community members is the illegal destruction of immediate natural resources in an attempt to fulfill their daily needs (Becken, 2010; Becken & Hay, 2007; Holden, 2008). This can further expose the environment and associated natural resources to various climatic stressors. This observation is supported by the following statement made by one of the elders of the Ngorongoro district during FGDs.

‘We will continue fighting until we get a solution ... we cannot continue leading people who are dying from hunger while resources are plenty’ (Village leader).

The immediate resources for the NCA people are undoubtedly wildlife and forest products. People use these resources to fulfil their needs. But also this study established that retaliatory (revenge) killing of wildlife is one of the options local community members (mainly Maasai) may take when they feel oppressed and their rights are denied by the government and NCAA. This observation is also reported in Estes et al. (2006). For example Estes (2006) reported that eviction of Maasai from the Ngorongoro crater in 1959 by the colonial government resulted in anger and low tolerance, where Maasai ended up killing 30 black rhinos and many other animals were injured. Discussions with some Maasai indicated that the revenge can also involve setting of wild fires to destroy other resources. Destruction of natural resources (e.g. wildlife and forests) can cause further biodiversity loss, more environmental pressure and consequently expose the area to the impacts of climate change, increasing vulnerability of NCA’s future tourism.

Water availability is one of the life support environmental resources that play a big role in enhancing the wellbeing of communities. As outlined in chapter five, NCA’s local community is facing serious lack of access to water compared to accommodation facilities, government institutions and employees. This increases the community’s sensitivity to severe and recurrent droughts. Although water shortages are declared in the NCA general management plan of 2006-2016, a serious challenge in the development of the area, noted in this research, is that accommodation facilities and communities belonging to NCAA staff have more access to water than the native people. This may be caused by the absence of infrastructures needed for supplying water to native people or ill-defined water entitlement and management systems.

7.6 Governance processes sensitivities

There is a strong relationship between governance and people’s vulnerabilities and/or resilience (Calgaro et al., 2013a; Cannon, 2008; Jiang et al., 2013). Governance influences the distribution and use of resources among different groups of people. Laws, policies and legislations, Acts and regulations are the basic tools used to reinforce governance (Calgaro et al., 2013a; Cannon, 2008). Understanding the way these

legislations affect the patterns of resource distribution and use requires the knowledge of governance (Calgaro et al., 2013a, p. 10). According to Cannon (cited in Calgaro et al., 2013a), governance involves the broader issue of power distribution and the ways in which those involved in the production and distribution of tourism product negotiate for desired use of resources. In this study, examination of how policies and legislations influence the sensitivity and resilience of wildlife tourism in NCA was conducted. This involved undertaking the inventory and analysis of policies/acts/legislations that govern the conservation area.

The management responsibilities of NCA are coordinated by NCAA. However, NCAA reports to the Ministry of Natural Resources and Tourism, which has the ultimate responsibility for this area (UNESCO, 2010). NCAA performs its operations under the core values of sustainability, valuing people (both visitors and local communities) and accountability (URT, 2011). The General Management Plan (GMP) 2006-2016 is a key document that NCAA uses to conduct its daily operations. All national policies, acts and legislations relevant to conservation, tourism and community development are echoed in GMP. Although they do not explicitly address climate change, they contain important elements relevant for increasing the resilience of wildlife tourism to climate change. Table 7-5 presents a list of policies and elements relevant for tourism and climate change. Similarly, table 7-6 presents how the policies have been implemented to increase the resilience of wildlife tourism. This study found that the effectiveness of prevailing governance processes in addressing people's access depends on the strengths and weaknesses of the policies used to execute governance. The appendix C-1 presents an analysis of strengths and weaknesses of NCA governing policies, and how they influence people's vulnerability and resilience to shocks and stressors.

Table 7-5: Policies and legislations relevant to wildlife tourism and climate change adaptation

Policy and legislation	Objective	Key element relevant to tourism and climate change adaptation
National Tourism Policy 1999	Seek to assist efforts to promote the economy and livelihoods of the people, by encouraging the development of sustainable and high quality tourism	<ul style="list-style-type: none"> • The policy recognises the importance of using tourism to improve people's livelihoods especially the poor; • It recognises the necessity of using sustainable tourism practices (low impacts tourism);

	that is culturally and socially acceptable, ecological friendly, environmentally sustainable and economically viable.	<ul style="list-style-type: none"> • It puts clear strategies on the how the local people can benefit from tourism e.g. through community based tourism (CBT); and, • It recognises cultural tourism as one of the means to enforce CBT.
Wildlife Policy 1998	Enhancing conservation of wildlife populations (with emphasis on threatened, endangered or endemic species), their habitat, and areas of scenic beauty, water catchment and soils.	<p>The policy:</p> <ul style="list-style-type: none"> • emphasises on combating poaching; • emphasises on greater involvement of local communities in conservation; • stresses the importance of reducing vulnerability of the local communities by increasing their access to livelihood assets (such as income, education, strengthening local community social networks); and • promote the use of indigenous knowledge in conservation.
Tanzania Development Vision 2025	Enhancing the achievement of high quality livelihoods, good governance and the rule of law; and a strong and competitive economy.	<ul style="list-style-type: none"> • The Tanzania Development Vision (TDV) emphasises on food security, access to education, reducing gender equality and women empowerment, access to high quality health care, reducing infant mortality and absence of abject poverty for all Tanzanians; and, it encourages economic diversification of at all levels.
National Strategy for Growth and Poverty Reduction 2005	Assists to enhance growth of income and reduction of poverty; improved quality of life and social wellbeing; and achieve good governance and accountability.	<ul style="list-style-type: none"> • Recognises that a large population of rural and urban communities of Tanzania are characterized by abject poverty; • Outlines the strategies to reduce abject poverty including increasing access to resources as outlined in TDV.
National Land Policy 1995	To promote and ensure a secure land tenure system to encourage social and economic development without endangering the ecological balance of the environment'.	<ul style="list-style-type: none"> • Recognises the importance of reliable land tenure system and entitlement on community development; • It recognises the importance of maintaining the ecological and environment integrity.
Agriculture and Livestock Policy 1997	To improve the wellbeing of the people whose principal occupation and way of life is based on agriculture.	<ul style="list-style-type: none"> • Recognises that most of the rural people are smallholder and livestock keepers, who do not produce surplus. Therefore the focus of this policy is to transform into commercialized agriculture so as to increase income of the people involved in agriculture.
National Environment Policy 1997	Seek to ensure that environmental resources (including wildlife) are protected and utilised in a sustainable manner and with the greater participation of local communities.	<ul style="list-style-type: none"> • Recognises the importance of practicing environmentally friendly tourism (ecotourism); • Recognises the importance of involving local communities in conservation and channeling the associated benefits to them; • Seek to limit tourism development projects perceived as having negative impacts on the

		<p>environment in wildlife conservation areas; and,</p> <ul style="list-style-type: none"> • If need arise the execution of the project will be based on the results of the Environment Impact Assessment study.
Rural Development Policy & Rural Development Strategy 2001	To ensure sustainable and profitable utilisation of natural resources for the benefits of rural people by involving local communities in management and utilisation of these resources.	<ul style="list-style-type: none"> • Recognise that economic diversification is a key approach for reducing vulnerabilities of the people in rural areas; and • Enhance environmental management practices that aim to reduce land degradation, water pollution and overexploitation of natural resources.
Mineral Policy 1997	To limit mining activities in protected areas	<ul style="list-style-type: none"> • Ensures that wildlife resources are protected from negative impacts that may arise from mining.
National Beekeeping Policy 1998	To encourage the establishment of bee-keeping reserves and encourage beekeeping practices that support conservation of ecosystems	<ul style="list-style-type: none"> • Recognises beekeeping as one of the livelihood diversification activities for the people living within or adjacent to wildlife reserved area; • The policy acknowledges that beekeeping is an alternative livelihood option that can be used to reduce over-exploitation of wildlife resources by rural people; • If well managed, beekeeping can be a source of revenues and contribute to the reduction of vulnerability of NCA local communities especially during crisis.
Trade Policy 2003	To improve domestic production (of goods and services) and build a strong diversified and competitive export sector as the means of achieving higher rates of economic growth and development.	<ul style="list-style-type: none"> • Provides key information for strengthening local people's capacity to improve their livelihoods; • Emphasises widening linkages among domestic producers; • Seek to increasing access to markets by domestic producers; • encourages product diversification; and, • Promotes value adding activities for the existing commodities (promote technological and innovative production systems).

Source: The NCA GMP, 2006-2016.

Table 7-6: Policy implementation and resilience outcomes at the local level

System component	Management objectives	Implementation outcomes	Current resilience levels
Natural resources	To ensure management decisions are made based on scientific and indigenous knowledge.	The use of scientific research in decision making is evident. The GMP is prepared based on scientific research. However, the GMP acknowledged that various matters related to water supply are under researched (URT, 2011). Similarly, the use of indigenous knowledge in decision making is not clear. A few studies on the contribution of indigenous knowledge in conservation of wildlife are available (Kideghesho, 2010). It can be seen that scientific knowledge has dominated indigenous knowledge. As a result it is difficult to ascertain the extent of the local people involvement in conservation.	High in conservation Medium in local community
	To ensure that landscapes and associated resources are preserved.	By observation, the NCA landscape and many the associated resources are preserved. However, climate change may alter changes in vegetation, as can clearly be seen in some areas. Leral forest, for example, is disappearing.	High
	To ensure that wildlife population have access to adequate water	Wildlife has continued to be accessible to water resources (rivers, lakes & ponds). However, fluctuations of water levels and contents as a result of climate change were reported during data collection.	High
	To ensure that viable populations of both common and endangered wildlife are preserved.	A significant number of both common endangered wildlife populations have been maintained. However, poaching of selected species is still a conservation challenge (URT, 2011, interviews)	
	To increase the number of wildlife in the area.	Some wildlife species have increased while others have decreased (URT, 2011). Local community and conservationists opined that generally wildlife population has increased as a result of conservation.	High
Tourism	To ensure that the values that have made the NCA to be accorded a world heritage site and a biosphere reserve are realised by the indigenous community, visitors and the general public.	This implies that these values (wildlife co-existing with people and livestock, and the presence of historical sites) are the main source of tourism and visitors, local community and the general public have the mandate to ensure their sustenance. However, local community that makes significant contribution to this accord is under a high risk of disappearing if the current problems facing them are not adequately addressed.	High
	To ensure active participation of the NCA local community in tourism activities	The involvement of local community in tourism activities is clearly seen. However, there are still remaining untapped opportunities for more participation of local community. Community members have opinions that	Medium

		although tourism contributes significantly to their economic capital, it is not providing sufficient livelihood protection.	
	To make sure that revenues from tourism are maximised	Generally revenues from tourism have been increasing since 1990s. In the same period, increased the number of visitors has also been realised.	High
Local community	To enhance active participation of the NCA indigenous community in decision making especially in matters relating to conservation, tourism and development.	A Pastoral Council (PC) was established and participates in all matter involving management of the NCA (URT, 2011). The majority of interviewed local community members regard the PC as more or less a political organ established to impress donors and the international community rather than a representative institution. Most of them consider their involvement in decision making as low and insignificant.	Low
	To ensure improved income for the NCA indigenous community	The NCAA's efforts to improve participation of local community in tourism are clearly seen through the establishment of cultural <i>bomas</i> to almost every ward. The NCAA also dishes out money ranging from 5% to 10% of its total revenues per year for community development. However, this research showed that the majority of members from the community consider this income as inadequate for development. The research found that there are various untapped tourism opportunities relevant for the community.	Medium
	To ensure 'continuous' food security among NCA indigenous community	Food insecurity has continued to affect local community. Incidences of starvations and deaths were reported during data collection.	Very low
	To ensure quality health services to NCA indigenous community	Cases of malnutrition among children, sometimes associated with deaths due to poor healths and diseases, were reported during data collection.	Very low
	To ensure basic services such as education and water supply are provided to NCA communities	Efforts to improve education services were clearly seen through many children attending schools. But participants of this research showed, however, that they are limited to primary education because they lack money to send children to secondary schools. Similarly, water shortage is another critical challenge issue for local community, indicating that the NCAA hasn't managed to provide adequate water supply.	low
	To reduce incidences of property damage and costs associated with wildlife infringement	Incidences of property damage, especially livestock predated by wildlife, were reported during FGDs. Lack of compensation remain a topic of major concern for the majority of participants.	Very low

Source: The NCA General Management Plan, 2006-2016.

7.7 Chapter summary

The purpose of this chapter was to report the factors that increase the sensitivity of NCA wildlife tourism to shocks and stressors. These include: tourism specific sensitivities; human specific sensitivities including access to livelihood assets; environmental sensitivities and governance sensitivities. The chapter has presented how these influence the vulnerability of wildlife tourism to shocks and stressors. The discussion of these factors presents a significant contribution to knowledge.

However, as mentioned in the literature review, to be sensitive alone does not provide sufficient information that a system is vulnerable to shocks and stressors until the adaptive capacity of a studied system is examined. The following chapter therefore moves from sensitivity analysis to reporting the factors that determine the adaptive capacity of NCA wildlife tourism components.

CHAPTER EIGHT: SYSTEM ADAPTIVE CAPACITY

8.1 Introduction

This chapter presents the factors that enhance the adaptive capacity to shocks and stressors of wildlife tourism. The chapter responds to part three of objective (iii) of this thesis (see table 8-1). As presented in chapters 2 and 3, vulnerability is a function of exposure, sensitivity and adaptive capacity to shocks and stressors. Whereas chapter 5 presented the shocks and stressors that triggered the NCA tourism system vulnerability; chapters 6 and 7 respectively discussed the factors that determine the system's exposure and sensitivity to shocks and stressors. This chapter then discusses the factors that determine the adaptive capacity of the NCA tourism system as were assessed during data collection.

Table 8-1: Research objective addressed in Chapter 8

Objective	What information is needed	How information will be gathered	Why the method is appropriate
3 (iii) To examine the factors determining the adaptive capacity of the NCA wildlife tourism system to shocks and stressors	Assessment of system <i>adaptive capacity</i> (with respect to the main elements of the wildlife tourism system)	Use semi-structured interviews; group discussion; and analysis of secondary data	Helps to understand and identify the factors that contribute to system adaptive capacity

The adaptive capacity determines the potential or ability of an individual, a system, a region or a community (of people or wildlife) to adapt to the negative impacts of climate change and capitalise on opportunities arising from adaptive capacity. Understanding the NCA system's adaptive capacity helped to establish how the system is vulnerable or resilient to shocks and stressors. The assessment of adaptive capacity involved examining the effectiveness of strategies adopted by NCA tourism actors (local community, tourism businesses and the ecosystem including wildlife and their habitat) in responding to shocks and stressors. This involved the assessment of dominant adaptation types (used by those actors) to offset the impacts of climate change and the outcomes of both short- and long-term coping responses. These key themes are summarised in table 8-2, and discussed in the following sections.

Table 8-2: Key themes and interview questions for assessing the system's adaptive capacity

System component	Key themes	Some examples of research questions	Some responses from participants	Method used to collect data
Tourism businesses	<ul style="list-style-type: none"> Short-term coping responses Long-term coping responses 	<ul style="list-style-type: none"> Are there any climate change adaptation plans available to your business? Are you aware of any planned government policies that are designed to assist the tourism industry to deal with climate change? Are there any local, national and/or regional emergency recovery plans in place for your business? How do these plans help you to adapt/cope with negative impacts? Are you involved in deciding what to include in those plans? 	<p>Emergency responses 'Unfortunately we haven't faced any serious effect that would require emergece helps'.</p> <p>Policy interventions 'Yes, we have an environmental policy as you can see our surroundings are well protected from erosion and full conserved to contain enough vegetation throughout'. (Hotel manager)</p> <p>Personal adaptations 'Because there's no business, I normally use the low season period to educate myself'. 'Because during low season many [tour] companies are closed I use this period to improve my private investments'.</p> <p>Network fortification 'Because we have a network of hotels throughout the country, when there is a crisis in one part of the country, we translocate some of our workers to our hotels in other areas' ... sometimes we opt for redunce of some workers if the crisis is to severe and the other hotels cannot hold more workers'.</p>	<ul style="list-style-type: none"> In-depth interviews Informal conversations Analysis of secondary information
Local community	<ul style="list-style-type: none"> Short-term coping responses Long-term coping responses 	<ul style="list-style-type: none"> How did you cope with damage you have mentioned? Are there any local, national and/or regional emergency recovery plans in place? How do these plans help you to adapt/cope with the damage you have mentioned? Are you involved in deciding what to include in those plans? 	<p>Immediate aid provision 'The authority [NCAA] provides us with maize and beans but this is not sufficient, and we have to pay some costs ...'</p> <p>Livelihood adjustment 'Our lifestyles have changed, we are no longer eating meat and milk [as our main food] ... we have a new set of [livelihood] needs which cannot be fulfilled by just meager aids we receive from NCAA ... agriculture is the only solution available for us'. 'Subsistence agriculture is our right like as it has been with other Tanzanians'.</p>	<ul style="list-style-type: none"> FGDs; In-depth interviews Observations and informal conversations

8.2 Tourism businesses adaptive capacity

As discussed in chapter five, political unrest in neighbouring countries, global terrorism and disease outbreaks were the main shocks that affected the tourism industry in NCA. However, interviewees reported that tourism enterprises were able to cope and returned to their usual businesses operations within a very short period of time. This represents the adaptive capacity of tourism businesses and the strength of their adaptive capacities. The assessment of adaptive capacity involved examining how these enterprises (including their workers) dealt with identified impacts. Since climate change is ongoing and thus a future event, the examination of adaptive capacity also involved examining how businesses are prepared to deal with future change. In other words, this examination was intended to identify not only short-term coping strategies but also long-term coping responses.

8.2.1 Short-term coping responses

Data analysis showed that there were only three short-term responses considered by interviewees as necessary for enhancing their resilience. These responses include: reliance on market forces (supply and demand); relocating or giving workers unpaid leave; and adjusting seasonal calendars.

Reliance on market forces

This study noted that relying on market forces (supply and demand) was one of the most important short-term strategies that NCA tourism businesses used to cope with shocks. Such reliance was indicated by almost all interviewed hotel and conservation managers. However, this research noted that this reliance was highly influenced by the type of shock and the place it occurred. The negative impacts caused by political unrest and disease outbreaks seemed to have little effect on the demand for hotel rooms at the destination, compared to most of the events related to terrorism. Similarly, because the impacts related to political unrest and disease outbreaks and terrorism originated in countries other than Tanzania, it can be argued that some tourists assumed Tanzania was safe to visit. Therefore, some tourists still visited the NCA even under warning announcements.

Discussion with hotel managers showed that, in most cases, high demand (involving both domestic and international visitors) for hotel rooms becomes a cushioning factor during negative impacts, especially when they occur outside NCA. This is because cancellation of rooms involves mainly foreign visitors who want to escape perceived security risks caused by those events. As a result demand by domestic visitors replaces that of foreign visitors, thereby cushioning the effect that may arise from those impacts.

‘Where the occupancy rate dropped because of [room] cancellation by international tourists [due to warning announcement], domestic tourists covered it immediately’ (Hotel manager).

A discussion with one of NCAA senior conservation managers revealed that currently there are five lodges in NCA which are able to supply only 560 rooms while the actual demand is for 1,200 rooms, especially during high or peak tourism seasons.

‘You know [the] demand [for accommodation] in NCA is very high compared to the supply, as a result our rooms are always occupied ... except during low season [where] you will find the occupancy rate goes down, but to no real effect. Normally when there are cancellations by foreign visitors, domestic visitors occupy the rooms’ (Manager from WL lodges).

‘Currently there are five lodges in NCA which are able to supply only 560 rooms while the actual demand is [for] more than 1,200 rooms, and we have no capacity to fulfil it ... this is a big challenge to us because every day we receive requests from investors demanding for construction of more [accommodation] facilities’ (NCAA senior employee).

Low supply of rooms in NCA is exacerbated by restrictions imposed by NCAA to limit construction or expansion of accommodation facilities for conservation purposes. Low supply creates high demand for accommodation in the area, which in turn becomes a coping strategy in neighbouring countries. With regard to these factors, the following statements were made by participants:

‘... we don’t encourage construction of more hotels or even expansion of the existing ones [in the NCA] because of conservation reasons’ (A senior NCA conservationist).

‘Due to high demand we wanted to construct some more rooms in our area but by the time we have started construction the NCAA authority

stoped us, you can see the site and the remnants of the demolished property' (Hotel Manager).

However, as explained in chapter five, there were a few circumstances where terrorism attacks produced severe impacts on tourism business. The bombing of the Paradise Hotel in Mombasa, and US embassies in Dar es Salaam and Nairobi caused the demand for rooms in NCA to drop dramatically. When these events occurred, the flow of international visitors was affected. During this period, the impact became more severe because even domestic visitors were afraid to visit the hotels. The 9/11 bombing was the most devastating terrorist attack, because it affected not only NCA but world destinations in general (Melita & Mendlinger, 2011). According to Melita & Mendlinger (2011), the impact of this attack lasted for a long period and tourism flow started to pick up again in early 2004. The impacts of 9/11 affected tourism severely because a large number of visitors to NCA come from USA. As the impact continued to be felt, accommodation and transport providers adopted other coping strategies. Relocation and redundancy (giving workers unpaid leave) was adopted as discussed in the following subsection.

Relocation and redundancy of workers

Relocation of hotel employees enhanced resilience of NCA. According to interviews with hotel managers, some or all of their workers were relocated to other hotel facilities that were less affected. For example, a lodge manager explained that during terrorism acts (mainly in Mombasa, Kenya) some of the workers were relocated to other hotels, such as those in Zanzibar and Dar es Salaam, where impacts of these events were low or not felt at all.

'When the impact was so strong we relocated our workers to some of our hotel networks in Zanzibar and Dar es Salaam. You know in big cities the impact is very low because of many people travelling [to those areas]' (Hotel manager).

Another short-term strategy adopted by tourism businesses was to lay-off some or all of their workers when the crisis was severe, and re-employ them after recovery. This strategy is not very common in accommodation as it is felt by transport providers. In both accommodation and transport sectors, redundancy usually occurs during low and off-seasons, even when there are no negative events. But when there is shock, redundancy of workers occurs occasionally, especially if the shock is severe and the

capacity of a respective institution to offset the impacts, without reducing their number of employees, is low. When a shock occurs, redundancy is considered as the last resort, especially if the capacity of the networks to accommodate workers from the affected facilities is low, or the whole network is disrupted.

Redundancy is the more common short-term coping strategy for transport providers or guide companies. Unlike accommodation, transport providers are more susceptible to negative impacts involving international tourists because they depend on them. Only a few domestic visitors hire vehicles from tour guide companies for tourism. Most of the domestic visitors use their own means of transport to visit destinations. When there are severe crises that deter the flow of international tourists, the main adaptation strategy adopted by these companies is to lay-off some or all of their workers and close the business until the situation returns to normal. Drivers and/or guides are the worst victims of redundancy. In most cases, these workers engage in small businesses or agriculture to cope with the situation until the season or situation returns to normal. However, this research established that in most cases newly employed workers become vulnerable because they have accumulated little or no capital to establish own businesses.

Seasonal calendar adjustments

As explained in chapter five, climatic stressors affect the timing of seasonal wildlife events such as migration and breeding. For example, it is commonly known that wildebeest stay in the Masai Mara for two months and return to Serengeti in October and later move on to NCA (*The Guardian*, 14 September 2012). See also figure 7-1. However, due to seasonal climatic variability (linked with drought) which occurred in 2012, the wildebeests spent only three weeks in Masai Mara (contrary to previous cycles) and returned to Tanzania in August (*The Guardian*, 14 September 2012). According to tour guides, if this situation continues to persist in future, this shift may have greater implication for tourist flow, and may consequently affect tourism profit. Although there have been no observed impacts on the flow of tourists as a result of these changes, tour guides have considered adjusting seasonal calendars as a future coping strategy, if climate change continues. This adjustment involves re-printing visitor brochures and fliers to inform them of these changes. However, the challenge remains: the pattern of future climate change is unknown. Thus simply adjusting the

seasonal calendar may not offer a sustainable solution. With regard to this seasonal shift, one local newspaper was quoted as saying:

‘This year the seasonal pattern of wildebeest migration has been affected. Since it has happened for the first time this year [2012], we may have to wait until 2013 to see if the same pattern repeats then we, as tour operators, will change our programme calendars and fliers to inform the entire world that the wildlife migration times and pattern has changed,’
(*Guardian Reporter*, 17 September 2012).

8.2.3 Long-term adjustments and adaptations

Business diversification: Backward and forward linkages

Although tourism businesses were impacted by shocks, this study found that the severity of the impact was not the same among tourism operators. This is due to differential adaptive capacities among them. This study established there were some accommodation and tour guide companies that did not close their businesses because of seasonal changes. They have adopted backward and forward linkages as a coping strategy. According to interviewees these companies have diversified their businesses to source markets.

Backward linkage occurs when a tour company opens guiding offices in the source markets. This research noted that some tour guiding companies in Tanzania own offices in tourist source markets such as the UK, Spain and Italy, and they use these offices to solicit tourists, even during the low season. Forward linkage occurs when a tour guiding company engages in providing accommodation services. Most of them also own tourist hotels in addition to providing transport services. This research noted that frequently these companies are operated in partnership between Tanzanians and foreigners. Operating businesses at a high level of secrecy is a common characteristic of these enterprises.

Future coping and adaptation strategies

Consideration of future climate change adaption strategies for business to adopt depends on what perception these business operators have in relation to climate change. In order to understand future adaptation strategies there were questions the researcher put to participants to capture their awareness and perceptions of climate change and their future adaptation plans. The overwhelming response was that all were aware of climate

change. However, some participants believe that climate change will not affect wildlife tourism in NCA. They perceived that the condition of the conservation area is stable. If there are changes related to drought frequency and severity, they are considered as normal cycles of climate variation. Therefore, for them, there is no need to worry about the future.

'Tourists come because of [the presence of] wild animals and these animals have been living here for centuries without any [climatic] problem; do you think they will just disappear altogether because of climate change? The dryness from drought you see in the crater is just within the cycles of climatic variations; it becomes on in one time and off in another time. It's only poachers who can finish the elephants [rhinos, and lions] if [they] are not controlled, but not climate change' (Manager from WL lodges).

Due to these perceptions, no future plans were in place for these organisations to deal with climate change.

Other participants were of the view that climate change, especially associated with severe droughts, was a real problem and in future will affect the survival of wildlife in NCA. But they also believe that climate change is a natural phenomenon, and cannot be controlled by human intervention. They considered the impacts of drought as one of the greatest future risks for the survival of wildlife, especially those that do not migrate. However, with respect to the effect of climate change on tourism, they opined that tourism will not be impacted severely, as tourists will come to see the remaining species (i.e. migrating wildlife).

'Drought is a real problem not only for the local people but [also] for the wildlife. However, I wonder if there's anybody who can control drought! You can control lack of water by bringing water from other places but not droughts' (Participant from SO lodges).

'Some animals will still survive the droughts especially those determined to migrate and [wildlife] tourism will survive too'.

As in the former group of participants, there were no future climate change adaptation plans in place as part of their future management strategies.

Policy intervention and planning

Another question related to policy was asked to participants (especially hoteliers, tour guides and park managers) in order to understand whether there were policies or future plans for the accommodation industry to deal with climate change. The participants seemed to have no policies that explicitly address climate change. What they have are environmental regulations in their facilities. When they were asked about climate change policies, they considered these regulations as climate change policies. Although addressing environmental issues is part of addressing climate change, a lack of policy that explicitly addresses climate change in both the accommodation, transport and conservation sectors indicates how these facilities are under-prepared. Similarly, lack of explicit climate change policies in these facilities indicates how weak the current national environmental policies in addressing climate change are.

‘Yes, we have an environmental policy; as you can see our surroundings are well protected from erosion and fully conserved to contain enough vegetation throughout, ... always green’ – I don’t know if you can call this a climate change policy ... yeah! I think so’ (Hotel manager).

Some of the interviewed hotel/lodge managers had perceptions that because they operate their businesses under the NCA regulations, addressing climate change is the responsibility of NCAA.

We have environmental regulations in our hotels but they are not directly linked to climate change. The issue (climate change) is even new to some of us. If there’s any issue related to that we advise you to consult [the] NCAA because we operate under their regulations.

Increased social cohesion and learning

It is widely accepted that the adaptive capacity of the system or people can also be improved by implementing purposeful actions such as building the capacity of communities through education and improved communication skills (Calgaro et al., 2013a). This study noted that, normally, accommodation and tour workers use their redundancy time (especially during the low/off-season and crises) to improve their knowledge and skills. Vocation training institutions are the most appropriate source of knowledge. Similarly, social cohesion is another mechanism they use to gain access to information. Mobile phones are the most preferred means of strengthening communication among workers as well as employers. It was established during this

research that, through effective communication, these workers remain updated and through improved communications they easily share knowledge relevant for coping with adversity. This in turn contributes to reducing their vulnerability to adverse events. The following quote was captured from a tourist driver:

‘Our regular communications through mobile phones and emails helps us a lot in information sharing which provide what is happening where ... and sometimes a friend can even tell you what you need to do to deal with the situation’.

8.3 Local community adaptive capacity: coping responses

As presented in chapter seven, the local community (i.e. the NCA indigenous community) was seen as being sensitive to the impacts of recurrent severe droughts. Drought has seriously threatened the wellbeing of this community and consequently may affect the future of wildlife tourism. To cope with this problem the community has adopted various mechanisms, which seem insufficient to offset the impacts of droughts. Under severe predicted future climate change, drought intensity may increase further and the future existence of this community maybe in jeopardy unless the adaptive capacity of Maasai to cope improves. This recognition created the need for the researcher of this study to examine short- and long-term adjustments that Maasai use to cope with or adapt to the effects of severe droughts and how they may affect wildlife tourism. This involved the examination of both the community’s own livelihood mechanisms for coping or adapting; and/or those arising from institutional arrangements.

Data analysis showed that livestock production is a dominant livelihood activity. For a long time the indigenous community of NCA has been earning a living from livestock. Livestock production has been a major means for this community to earn money for buying food, clothes, sending their children to school and, for some families, a means to invest in small and/or large businesses. It is also used to pay dowry. ‘There are people from NCA whom have become rich and even invest in large scale businesses just by selling cattle’ (Conversation on 17/02/2012 with NCA local community member). However, as presented in chapter seven, the current state of livestock production in this area is in jeopardy because of recurring severe droughts that kill many livestock every

year. As a result, livestock is no longer a reliable source of livelihood for many people living in NCA. In this regard, one respondent from Moklal village said:

‘It is known worldwide that this area [the NCA] was reserved for wildlife, Native residents and livestock – even [the] UNESCO knows this; but now the livestock are dying, we don’t have any other means of living. Other economic activities are restricted ... we are neither cultivating nor doing any other business’.

Therefore, failure of livestock to satisfy community needs has encouraged the Maasai to adopt both short- and long-term livelihood adjustments, thereby accommodating non-traditional strategies including migration to town, seeking government food subsidies, and poaching (illegal harvesting of natural resources). Long-term adjustments include tourism and/or abandoning pastoralism to engage in agriculture (crop cultivation). This study noted that some of non-traditional livelihood strategies are not compatible with conservation and if allowed to continue in the long run may deplete natural resources critical for tourism.

8.3.1 Short-term livelihood adjustments

Rural-urban migration

This is one option that some Maasai warriors have elected as a coping strategy. This is voluntary migration, which involves mainly young male Maasai, both educated and non-educated. A few educated Maasai normally migrate to towns to seek formal employment in government, NGOs and/ or private offices. Similarly, unskilled Maasai migrate to town to seek casual or unskilled labour such as security guards. Voluntary migration, if strategically planned and promoted, can be a positive option for reducing human population growth in NCA. The danger associated with this option is the increased contamination of Maasai youth with HIV/AIDS which, upon return to their ancestral land, they transmit to other residents including their wives.

Seeking government food aid

One of the NCAA management objectives is to promote pastoralists’ economy by providing adequate social services to improve human wellbeing (URT, 2010). The NCA GMP of 2006-2016 stipulates clearly that this objective is achieved by ‘continuously’ ensuring that NCA native residents: have food security; have reliable income sources; participate fully in decision making related to conservation, development and tourism;

are provided with quality health services, education and water supply; and are relieved from costs associated with property damage and wildlife infringement. . In addition to the routine provision of those services, NCAA is responsible for ensuring that the NCA indigenous people receive immediate aid during crisis (conversation with one of the NCAA managers). According to the literature (Smit and Pilifosova, 2003), provision of all these services is central to improving the adaptive capacity of the target population. One of the NCAA managers added:

‘The NCA has been doing this for quite a long period (Conversation one of the NCA senior managers). Provision of food aid especially during crisis is one of our duties. It is our obligation to serve the native residence with needed supports and this is done with immediate response especially a severe crisis occurs’ (NCAA manager).

However, the question remains: have these strategies succeeded to improve the wellbeing and adaptive capacity of the NCA native residents? During FGDs, participants from Maasai groups mentioned that it is true they receive food aid (mainly during crisis), which they use to cope with hunger during severe droughts. But according to these participants, the food is ‘almost nothing’ because it does not meet their needs. Some of the problems mentioned include: low amount of foodstuff provided (i.e. 10 kilograms of maize and 1 kilogram of beans for a family of four to five people throughout the season), which is considered inadequate; food aid often comes too late and some community members have already succumbed to starvation; and the food is sold, while, in essence, it is supposed to be free. The following opinions were raised by participants:

‘People should not say that NCAA is giving us food because it has never fulfilled our needs. I can prove as a village leader that there has been no aid from NCAA to support the community [which is dying] from hunger this year.’

‘The NCAA provides us with a few kilograms of maize and beans but we have to pay ... the government gives us food in one hand and takes it with another hand’.

‘If the government can feed millions of refugees from Rwanda, Congo and Burundi, why [does government] fail to feed us, we are just less than 100,000 people’. This is negligence by the government’.

Because this aid lasts for a few days, villagers have to design their own mechanisms of living with starvation. However, many of these mechanisms are not effective to offset the problem. The participants reported that women normally collect firewood for sale at TSH 100-500 (US\$ 0.3) per day to get money for food. When buyers have no money, the remaining solution is for most of the community members to eat low quality, wild fruits and vegetables. Many participants reported that 2012 was associated with severe drought to the extent that even the wild fruits and vegetables perished. This situation forced the community to eat maize bran as there was no alternative. Bran is obtained from maize husks, and is usually fed to calves and chickens, not human beings. As reported in chapter six, many children suffered starvation, malnutrition and others succumbed to death as a result of the drought. In general, the current system of food aid provision by NCAA was considered by native residents as inadequate and unreliable.

It was reported that every year NCAA provides money (about TSH 500 million – more than US\$300,000) through the Pastoralist Council to support community development activities. However, there is concern that ‘little of this money is directed towards social development for the indigenous people, although they are directly impacted by the implications of tourism and wildlife management’ (Swanson, 2007, p.21). The Pastoralist Council is a body composed of selected NCA pastoralist members and established to ensure the NCA native residents are represented in various decision-making processes. Nevertheless, concern was raised during informal conversations with some indigenous people that this council is a political organ, established by the government, to show the world that NCA’s local community is represented in various levels of decision making. But in reality, it aims to safeguard the interests of NCAA and government. Lack of reliable representation about matters that directly affect the Maasai reduces their adaptive capacity and increases vulnerability to droughts.

Illegal harvesting of natural resources

The researcher asked participants a probing question: suppose all livelihood options available to local community fail to reduce vulnerability, what would they do to ensure they survive? In response to this question, many earmarked the natural resources surrounding them, mainly wildlife and forest trees. Analysis of data from native residents indicated that wildlife can be the last resort, if other proposed options

(agriculture, land entitlements, and raising income from tourism) fail. The following issues were raised during group discussions:

‘We cannot die while there is plenty of land, what we need is access to land. I need access to land because everybody depends on land for food and other investments’.

‘There is hunger in Ngorongoro [Conservation Area] because the people are not allowed to own land. There is no water, cattle are dying every year; no pastures and people are dying from hunger, where is the government? The government must reassess the current [NCA] governing law that restrict us from cultivation because what if we eat those animals?’

‘We cannot die while there’s a plenty of resources around us’. ‘If we have managed to eat bran, do you think we will fail to eat those animals?’

‘There is no water, cattle are dying every year, no pastures, and people are dying from hunger, where is the government? The government must uplift the law that restrict us from cultivation because what if we decide to eat those animals due to hunger, will that be wrong?’

Others who requested anonymity informed the researchers that some Maasai are already consuming some wildlife species mainly elands. This is evidence of climate change impacts on people’s culture, as eating wild animals is taboo for Maasai and against their cultural values.

8.3.2 Long-term livelihood adjustments

Engagement in tourism

The government of Tanzania recognised the problem of dying livestock and promoted the involvement of NCA local community (native residents) in tourism activities, through community based tourism (CBT). The concept of integrating native residents with tourism emerged from the reality that most visitors coming to Tanzania seek to experience wildlife and lifestyles of the local community (Melita & Mendlinger, 2011, 2013). Since the 1990s the local community was integrated with tourism and these people have received this opportunity with great enthusiasm (Melita, 2011). Most local community family members opted to engage in tourism and there are many ways in which they are involved: through cultural tourism; tour guiding, especially

trekking/walking; employment in lodges and campsites; and selling handcrafts to visitors (Melita & Mendlinger, 2011, 2013).

Cultural tourism is currently a dominant means through which the local community participates in tourism. It is practiced in special places called 'cultural *bomas*'. A cultural *boma* is a Maasai homestead constructed in such a way that many related Maasai families can live with their livestock. One *boma* is constructed to include many small houses intended for each family to live in. The *boma* is surrounded with wooden fences which are constructed to protect livestock from being eaten by predators like lions, hyenas and leopards. Therefore, a cultural *boma* is a place constructed to reflect the real life of Maasai people. It contains all the necessary aspects of a Maasai homestead.

Participation in cultural tourism is rotated among all family members of the local community to ensure that each member benefits from tourism. However, the participant complained that the rotation takes a long time and the money earned is not enough to cover all expenses before another rotation comes. Arrangements are made in such a way that a fee of US\$25 per vehicle is paid to the cultural *boma*. And, at the end of the month, the total amount collected is shared among all family members who participated in tourism during that period. However, a common problem with cultural tourism is that local community family members have no direct access to visitors other than tour guides (drivers). Therefore, the requirement to take visitors to the *boma* remains at the discretion of a tour driver, something which may limit the local community from gaining other opportunities tourists may offer. Similarly, lack of direct access to visitors limits local community from maximising benefits from tourism.

After gaining substantial experience in cultural tourism, what do people from the local community say about this livelihood strategy? This research indicated the majority of the local community has positive attitudes towards cultural tourism. However, these community members are concerned they are currently not benefiting from cultural tourism or where there are benefits, the benefits are not sufficient to offset the damage caused by droughts

'I have been participating in [cultural] tourism for more than five years but I don't see any change in my life ... it's true we are getting money but if it can't help [to] change my life, it is useless then, the money is too little to purchase food, clothes and other necessities ...' (Community participant).

Participants reported that one of the limiting factors is that fees are not paid directly to the *boma* because people from the local community have no direct access to international tourists. Instead, tour guides/drivers receive the money and pay to the *boma* leader. It may happen that some tourists pay more than USD\$25 but the driver will only pay the agreed fee to the *boma* and leave with the remaining money. Also as the decision to take tourists to cultural *boma* remains at the discretion of a tour driver, this practice sometimes may involve corruption for drivers to deploy visitors to the *bomas*. It was reported by the local community participants that out of US\$25, a bribe amounting to US\$5 is returned to the drivers for them to continue deploying visitors. It was reported that if a *boma* leader denied returning this amount, a driver would not deploy visitors to that *boma* in the next time. The following issues were raised during group discussion:

'The thing I am not satisfied with [cultural] tourism is that it is only benefiting drivers (tour guides) in our expenses. One day, I witnessed from my eyes a driver receiving a lump sum of US\$300 from a group of [international] tourists who visited our *boma* but he [the driver] gave us only US\$25 ...even this you have to bribe a driver in order to bring tourists in the next time, this is unfair. The problem is [that] we have no direct access to tourists'.

Trekking/walking is another form of tourism activity that the local community members engage in. This emerged because a substantial number of tourists opt to explore nature by using all five senses (seeing, touching, hearing, smelling and tasting). They are not interested in sitting on the safari vehicle and watching the animals (informal conversation with a senior conservation officer). According to interviewees, trekking provides more employment opportunities for the local community than lodges and other tour guide companies. The local community members are generally regarded by visitors as excellent wildlife trekkers because they know a great deal about nature (Swanson, 2007). However, it was established during discussions that the amount of income accrued and the number of local community members recruited for trekking depends on

the number of visitors deployed who opt for this mode of tourism as well as the walking distances visitors would like to cover. One interviewee from Kakesio village said:

‘You know normally visitors who come to Ngorongoro are international and majority are interested in watching wildlife and other things comes just by the way. But if you get those interested in walking ... there is good money because you have direct access and negotiation is direct. And apart from the fee you agree [with the visitor], some tourists become impressed after the journey and give tip, you know tip? Tourists pay extra money as a way to appreciate that you have done a great job’.

Another way that the local community benefits from tourism is by employment in hotels/lodges, campsites and/or guiding companies. The NCA GMPs of 1996 and 2006-2016 suggested that employment priority must be given to native residents who may wish to opt for formal or informal employment as a livelihood strategy (URT, 2010). However, education levels to be employed in these facilities matter. Most employers prefer the candidate to have an education level of at least secondary school. Most people from the local community have only reached primary education – the level that equips a person with only writing and reading skills, mainly in Kiswahili (Swanson, 2007). At least the secondary school level is preferred, because it enables an employee to communicate fluently with visitors who are mostly English speakers. Perceptions of employers toward the local community discourage them from employing local community members. Most of them perceive that people from the local community are unreliable because they place more emphasis on their livestock than formal employment (Swanson, 2007). Therefore, most people from the local community are not employed in these facilities, contrary to the GMP suggestion. But during group discussions, one local community member said:

‘Ngorongoro [Conservation Area] is full of lodges and campsites but nobody from among us has benefited from their presence, ok, they say we are not educated ... but there are jobs which fit us, even to be employed as a watchman, is that difficult? What needs more to take care of a property?’

The NCA’s native residents participate also in tourism by selling handcrafts. These are sold at the cultural *bomas* and at hotel/lodge premises. Most handcrafts sold at the *bomas* belong to local community men, while most handcrafts sold at hotels/lodge premises belong to women. Unfortunately there was no clear explanation as to why

such an arrangement exists. All of the handcraft businesses belonging to the local community are on a small scale and they are for earning subsistence income. There are also large retail outlets selling handcrafts located at the entry gates (especially the main gate), within the hotels/lodges and at Karatu town and Arusha city, but most of these outlets belong to non-native residents. However, most of the local community people consider their handcrafts businesses as unreliable for many reasons: (1) they depend on the interests and preferences of tourists and the number of tourists deployed at the *boma* matters, thus the issue of access to buyers is very important; (2) as with tourism, the business is seasonal; and (3) the business needs a large injection of start-up capital, for which many Maasai do not have.

There is also another tourism opportunity where local community members pose for photos with tourists. This is done at the discretion of the involved member but the tourist must pay. The current price of one photo ranges between US\$5 and US\$10. However, some people from the local community say that posing for photos disgraces them.

‘What make me sad is that taking photo with tourist - because of the way I am is good for money - but, I feel humiliated, I would think money from tourism can be increased by using other means such as the NCA increasing share of tourism income to the natives, at least 40% could be enough’.

‘If income from tourism is raised to 40% you won’t hear Maasai talking about agriculture. After all cultivation is not our tradition, we are just forced by the situation [to cultivate]’.

In general, the majority of NCA local community members consider their engagement with tourism as not reliable for their future, although they are not planning to abandon tourism. Most of them are of the view that it is a livelihood strategy that lacks a promising future, especially if operated as it is now. They cite specific problems including lack of adequate income from tourism to sufficiently offset the impacts of droughts. Therefore, based on the perceptions of the local community, it can be argued that wildlife tourism in NCA is lacking an intra- and inter-generational equity, contrary to what sustainable development requires.

Because the local community members are not sure of the future of tourism, as they consider it unreliable, they propose a long lasting solution: engagement in agriculture, indicating their strong desire to engage in crop cultivation.

Crop cultivation

Due to unreliability of livestock and tourism to satisfy their needs, local community members have raised strong desires to engage in crop cultivation. This study noted that in the 1990s some local community members tried crop cultivation and there were positive outcomes. Peoples were self-sufficient in many life aspects. The decision to introduce crop cultivation in NCA was made after the president of Tanzania had advised the NCAA to lift restriction on crop cultivation. The president reached this decision after realising that the majority of this community was suffering starvation, and the government had no sufficient capacity to feed them. However in 2000s to date restriction to cultivate crops in NCA was re-imposed in recent years. All local community people who participated in FGDs are in support of agriculture, as they consider crop cultivation is the most reliable solution to their livelihood problems.

‘The government is aware that our needs have changed and we need food crops from farms, you are all aware of this ... we neither have money to buy food nor access to transport food bought from other parts of Tanzania, so the only solution is for the government to allow us cultivate in NCA’.

The issue that emerged from data analysis is the strong desire of the local community to be self-sufficient in food and income. This is because of their view that the government has failed to provide sufficient food and other essentials to meet their needs. Therefore, the solution is for them to cultivate and produce their own plots.

‘For all of us here in Ngorongoro [Conservation Area], agriculture is the only means that can fill the gap of dying livestock. With cultivation we can produce for home consumption and also sell some crop produces to get money for other needs’. We are tired of being fed like kids; we need to feed ourselves from our own efforts. Agriculture is the only solution to this problem’.

‘I am not a calf to be fed, I need to cultivate myself’ (Villager).

‘If the government continues with its slogan that agriculture is a backbone of Tanzania, why does it fail to allow us to cultivate crops? ... we must be allowed to cultivate crops [in NCA] like other Tanzanians do’.

The local community is currently facing the challenge of persuading the government to permit them to practice agriculture. One strategy they have adopted is to seek land entitlements and well-defined land tenure.

Seeking land entitlements and tenure:

Legal rights to access natural resources (entitlements) are one of the factors mentioned in the literature that enhances the adaptive capacity of individuals or groups of people (Fussel, 2007; Smit & Wandel, 2006). One factor that aggravates the current situation for the local community in NCA is the lack of land entitlements and tenure. For example, this research established that many local community members are of the view that the problems they face are centered on the current law governing NCA. They consider the law as oppressive because it denies Maasai people access to land and other natural resources necessary to promote their wellbeing.

‘The law governing [the NCA] is very oppressive; it has restricted us from enjoying the nature that God has provided us. The oppressive law favours animals in the cost of native people, it favours animal protection than human being who protects the animals, yeah, [and] I can say we are the most renowned wildlife protector, because we have lived with them for century and century without harming them. We must be given equal treatments’.

‘NCA cannot be a world’s heritage site if the native residents who have been living with animals are not given priority. I suggest that instead of having Ngorongoro Conservation Area Authority [NCAA]; we need it to be a ‘Ngorongoro Native People Authority [NNPA] – this will give us more power to decide on our matters’.

Almost all group participants believe that recurrent hunger in NCA is caused by the lack of land entitlements. They believe that access to land is the central solution to all kinds of droughts because they will conduct various activities on the land including agriculture, construction of permanent facilities, such as lodges for low income visitors, retail shops and markets for crops and livestock products. Similarly they are of the opinion that from the land they will grow surplus to sell and get money for paying for veterinary services to improve the health of their livestock. In general, the local community living within NCA becomes more vulnerable to drought compared to communities from outside the area because of limited diversification. The communities from outside the NCA have a wide range of livelihood diversification including

agriculture; small scale businesses such as shops, restaurants and guest houses; and small scale mining, which helps to improve their capacity to cope with droughts (Yanda & William, 2010).

If agriculture was allowed it may have the following consequences: (1) it is also considered vulnerable to climate change; (2) it may require the use of insecticides, which may not be suitable for the health of wildlife; and (3) it may lead to blocking wildlife migration corridors and contribute to other related wildlife disturbances. All these may impact wildlife tourism in the future.

8.4 Policy adaptation

Policy is another type of adaptation strategy that the government may use to increase the adaptive capacity and reduce vulnerability of communities to climate change. Policies are mainly intended to reduce exposure and sensitivity, thereby increasing the adaptive capacity of a considered unit of analysis. Under climate change policy interventions are planned and implemented by the public agency to back up the individuals' natural or autonomous adaptation. Planned adaptation is often interpreted as a deliberate policy decision undertaken by a public agency based on an awareness that conditions of a certain environment are about to change, or have changed (due to climate change), and that actions are required to prevent or minimise loss caused by those changes and capitalise on benefits arising from them (Smit & Pilifosova, 2003).

Although climate change adaptation is not explicitly addressed in NCA management plans, the activities contained in the NCA GMP document, have relevancy to adaptation. The GMP leads the implementation of NCA goals. It is designed in such a way that the activities therein cover a wide range of adaptation strategies needed by each wildlife tourism stakeholder in the destination for a given period of time, usually ten years. The current GMP, which covers a period between 2006 and 2016, contains a list of goals, objectives and activities relevant to managing natural resources, people (local community) and tourism.

In general, NCAA seeks to maintain the multiple land use system where wildlife, ecosystems, local community and tourism are managed in a balanced manner. Given

this need, the NCA main goal is to *'ensure that the ecological integrity and biological diversity of the NCA are managed as integral components of the multiple land-use system; and ensure that the natural resources are essential to the quality of life for local residents, tourists and are the heritage of the nation and the world'* (URT, 2010). By implementing this goal, the GMP activities echo various policies relevant to management of wildlife, the ecosystem and local community and tourism development. In climate change language, it can be said that the policies are designed to enhance adaptive capacities of wildlife tourism stakeholders in dealing with adversity. It is important to note that although these stakeholders work together to influence the functioning of the whole tourism system, 'each has distinct interests (needs), information, resources and risk perceptions and hence would consider different types of adaptive responses' (Smit and Pilifosova, 2003, p. 884). Therefore the role of policy intervention is to address adaptation with respect to the need of each category of wildlife tourism stakeholder, as explained in the following subsections.

8.4.1 Policy adaptation in enhancing the adaptive capacity of wildlife and environment

Natural resources are an important component that makes up the NCA wildlife tourism system. One of NCAA's core roles is to ensure that wildlife and their habitat are preserved for the present and future generations. Normally, in unmanaged environments adaptations of wildlife occur autonomously. In managed environments, the role of a public agency is to plan and implement interventions to support the autonomous adaptation of species. 'Autonomous adaptations are those that take place invariably in a reactive response (e.g. migrations) after an initial impact manifests, to climate stimuli, without the direct intervention of a public intervention' (Smit & Pilifosova, 2003 p. 883). But there is high uncertainty about the capacity of species to adapt autonomously in a changing climate. Planned adaptations are therefore needed to ensure that the capacity of species to adapt autonomously is maintained. This may prompt the government to implement policies intended to reduce the exposure and sensitivities of wildlife species to climate change.

In ensuring that species maintain their natural adaptations, the responsible agency/institute imposes various actions. In NCA this study established that most of

these activities are focused on restricting human activities from disrupting the environment. It is widely acknowledged that increased human activities across migratory corridors can destroy the environment and expose wildlife to climate change stimuli.

As shown in chapter five, the NCA population is far beyond the carrying capacity of the area. This study showed that the population growth rate of the NCA local community poses a serious threat to autonomous adaptation of wildlife. As mentioned before, according to the EIA conducted in 2007 by NCAA, NCA can only accommodate 25,000 people with livestock (Nyahongo et al., 2007; UNESCO, 2010). The current human population is over 62,000. Currently, NCA is addressing population issues by encouraging voluntary relocation of people (UNESCO, 2010). However, during FGDs local community members opined that they were not ready to move out away from NCA, because there are no incentives provided for them to leave.

According to the FGDs, Maasai consider this type of adaptation ‘unacceptable and inhuman’, especially if conducted by force. According to Maasai, this type of adaptation indicates the world’s emphasis on wildlife rather than human beings. This increases tension between Maasai and conservation societies, especially UNESCO. If not handled well, the implementation of this strategy may have serious negative impacts on wildlife and consequently may affect tourism, especially if Maasai decide to retaliate. The FGD participants made the following statements.

‘We can’t move out. We have been living here for decades and decades with wildlife. Today those [conservationists] who think [that] they know conservation than we are want to evict us, we can’t accept this’.

‘We know conservation [of wildlife] more than any other people in the world. You see, people travel from all over the world to see the wildlife we have conserved, yet they want to evict us from our land. Other people have killed their animals, ask them they will tell you yes, we killed them, we finished them. Tell the government that it should not be bulldozed by UNESCO’.

This study noted that tension emerged as a result of the proposal for voluntary relocation of Maasai, and heightened by local media. The media inflame the issue of relocation because of the terminology they use to report the issue. ‘Eviction’ is the most

popular term most media have been using. To the Maasai, eviction implies removing them by force. For instance, in May 2009 and February 2010 the local newspaper made the following statement:

‘The United Nations Educational, Scientific and Cultural Organization, UNESCO has raised a ‘red flag’ against Ngorongoro Conservation Area, NCA, threatening to remove it from the list of World Heritage sites, over the territory's ecological deterioration’ (*The Guardian*, 4 May 2009).

Banning crop cultivation in NCA is another policy intervention adopted to safeguard natural resources from human activities. However, this strategy did not come up with an alternative solution. As a result, the benefits of this strategy are not reflected by local community. This continues to heighten the tension between local community and conservationists because of the notion that wildlife can be valued over human beings. However, this tension can have its advantages or disadvantages for tourism. It can be an advantage if people get angry and decide to migrate. But it can be a disadvantage if people decide to feed on wildlife, because they have no alternative source of food, or they may decide to retaliate because of anger.

8.4.2 Policy adaptation in enhancing local community adaptiveness

‘Activities required for the enhancement of people’s adaptive capacity are essentially equivalent to those used in promoting sustainable development’ (Smit & Pilifosova, 2003, p.880). All policy interventions required to address the welfare of the poorest member of society are essentially the activities required by these people to adapt to climate change. These include activities such as: improving people’s food security; facilitating access to safe water and health care; and providing shelter and greater access to other resources (Smit & Pilifosova, 2003).

Although the NCA GMP contains all these activities the majority of local community members have remained food insecure and inaccessible to water, health services and other life affirming resources. The GMP was prepared in 2006 but to date (2014) these problems have continued to affect local community. This is an indication that the strategy used to implement these activities is either ill-designed, or there is a general lack of sufficient capacity, by the implementing institution, to address these problems. If

the latter is true, it suggests that enhancing the adaptive capacity of the institution responsible for policy implementation is a prerequisite.

8.5 Chapter summary

This chapter presented the factors that determine the adaptive capacity of the NCA tourism system across its major components: accommodation and transport (only those operating within the destination); the local community and wildlife and their habitat. In essence, the assessment of adaptive capacity concludes the process of vulnerability assessment. The assessment of vulnerability as discussed in this chapter confirmed that accommodation and transport are relatively more adaptive to shocks and stressors. However, although there is great awareness about climate change, the knowledge of how to address climate change is not clear among accommodation and transport providers. This raises questions about the capacity of these closely related sections to address climate change in future. The NCA native residents however have adopted various strategies to deal with the effects of recurrent severe drought but most of their strategies are not adequate to offset drought impacts. Due to failure of these strategies, the community is being forced to change its traditional lifestyle in order to adopt new strategies that, they believe, will enhance their capacity to deal with the impacts and attain improved wellbeing. As a result, the community is in need of new sets of essential needs. The community considers land entitlements and agriculture would be the best, short- and long-term options. They also consider consumption of natural resources, mainly wildlife, as another option, if they fail to get permission to cultivate crops. All these strategies are not compatible with conservation and may have serious impacts for the future of wildlife tourism. Therefore, the host community must be considered as the future threat to wildlife tourism, and immediate actions to help this community address the impacts of drought must be designed and implemented immediately. This is an urgent priority. The following chapter therefore, presents the proposed adaptation recommendations relevant for wildlife tourism.

CHAPTER NINE: RECOMMENDATIONS FOR INCREASING ADAPTIVE CAPACITY

9.1 Introduction

Chapters 6 and 7 presented the factors and processes that contribute to exposure and sensitivity of the NCA wildlife tourism system to shocks and stressors. These are negative factors that heighten vulnerability of the system. Similarly, chapter eight discussed how the system adapts to shocks and stressors. The discussion involved identifying how individuals, community and government contribute to enhance the adaptive capacity and resilience of wildlife tourism. It became clear there are some adaptation strategies that enhance the adaptive capacity of the system against shocks and stressors. But there are adaptations that have inherent weaknesses, and these may increase reduce the system's adaptive capacity of the system. To increase the adaptive capacity of the studied system, adjustment of existing adaptations and putting deliberately some additional adaptation strategies is important.

This chapter therefore discusses how the adaptive capacity of the studied system can be increased. Increasing adaptive capacity represents a practical means of improving the capacity of the system's components (including people, wildlife and ecosystems) in coping with climate change impacts and uncertainties (Smit &Wandel 2006,). Increasing the adaptive capacity - of the wildlife tourism system incorporates the designing of diverse adaptation strategies to: reduce exposure and sensitivity to climate change risks; absorb and recover losses from climate change; and capitalise on opportunities arising from adaptation (Jopp et al., 2012). Usually the enhancement of adaptive capacity comes after the assessments of vulnerability and existing adaptation have been completed and areas that need capacity improvement have been identified (see chapters 6, 7 and 8). This chapter addresses the fourth research objective as presented in table 9-1.

Table 9-1: Research objective addressed in Chapter 9

Research objective	What information is needed?	How information was gathered	Why the method is appropriate
(4) Proposing adaptation strategies to improve the adaptive capacity and increase resilience of the system.	<ul style="list-style-type: none"> Proposing new strategies for improving the adaptive capacity of the studied system. Recommendations for further improvement of adaptive capacity. 	<ul style="list-style-type: none"> Reviewing the literature. Gap analysis to identify what is really missing in existing adaptations. 	<ul style="list-style-type: none"> The literature review helped to identify various adaptation options. Gap analysis helped to identify adaptation gaps.

9.2 Increasing the adaptive capacity through adaptation

The assessment of NCA tourism system's adaptive capacity presented in chapter eight provided an understanding of how the studied system is strong or weak against shocks and stressors. The assessment was particularly important, because it enabled the researcher to understand and evaluate the current level of vulnerability and resilience, including understanding the capacity of this system in sustaining wildlife tourism against climate change. It became clear that across the system, there are some factors that enhance adaptive capacity of the system components (tourism businesses, local community and wildlife) to shocks and stressors. But also there are factors that increased their exposures and sensitivities to climate change. The study established that due to differences in exposure, sensitivities and adaptive capacity contexts, there were differential vulnerability and resilience among the system components. Therefore the ultimate goal of the assessment involved the identification of areas that need improvement (i.e. gap analysis). Literature has shown that the most vulnerable (people or wildlife) are often those that are highly exposed, sensitive to climate change effects and have low adaptive capacity (Adger et al, 2005; Becken & Hay, 2007; Smit & Pilifosova; 2006). Following this identification, the next step involves proposing adaptation recommendations to fill the gaps and further improve capacity. Thus proposing adaptation strategies appropriate for each of the studied system components is the focus of this chapter, as discussed in the following subsections.

9.2.1 Increasing the adaptive capacity of local community

This study established that across the NCA tourism system, local community was the most vulnerable component to shocks and stressors. This is however not to say that other system components were completely resilient, but rather vulnerability was less severe because of their relatively higher adaptive capacity. The vulnerability of local community is attributed to the lack of sufficient capacity to cope with the impacts of climate change. The assessment of sensitivity (see chapter seven) showed that most of the livelihood options available to the community were weak in offsetting the effects of climate change. This study recommends that the enhancement of adaptive capacity of local community should target increasing strengths of the existing livelihood strategies. This should target providing services to enable the local community to reduce overdependence on government aid and natural resources critical for wildlife tourism. Activities required for this are essentially those intended to reduce exposure and sensitivity of livestock to droughts, and those required to increase the community's access to other livelihood assets and participation in tourism. Referring to the latter, improving the adaptive capacity may involve: increasing local community's entitlement to land (i.e. rights to own land) along with defining land tenure (defining land use systems); improving community participation in tourism along with income; pursuing initiatives that promote the welfare of the community – e.g. improving food security, improving the delivery systems of food aid by the government in terms of timing and quantity; facilitating access to clean and safe water; and improving provision of health services and community access to education. Others may include improving community's access to employment and financial/economic resources.

This study noted that since the NCA local community operates in an area which is completely controlled by the government, policy becomes a foundation for all types of adaptations the community can opt. For instance, it is the policy that may define the land tenure security and community's right to own land. Therefore, any attempt to increase the community's adaptive capacity should aim at improving the prevailing policies.

The government of Tanzania's commitment to reduce vulnerability is very clear in the national policies, as reflected in the NCA GMP. Appendixes C-1 and C-2 summarise

the policies and NCA's main management goals and objectives relevant to natural resources, tourism and local community development. This research showed that the government through policy strategy is making commendable efforts to reduce local community vulnerability by improving their access to livelihood resources, as reflected in the NCA GMP. The prevailing GMP stipulates clearly its strategies to sustain local community. For instance, one of the strategies relevant for local community development requires that humans and their livestock must have access to quality and adequate water. Another strategy appeals to the government's to improve food security for local community. While the implementations of these strategies have shown significant positive outcomes in government employees (particularly in terms of water availability), for local community positive results are yet to be seen. Local community have continued to face water shortages (for both people and livestock), food insecurity and diseases. This indicates the inefficiency of current government policies responsible for improving the wellbeing of local community. In other words, the prevailing government policy interventions are not sufficient to offset damages caused by climate change, especially severe droughts. This feedback presents one of the references against which the effectiveness of current community development policies can be evaluated and improved.

One of the weaknesses of existing NCA governing policies is lack of a clearly defined land entitlement and tenure. The issue of land entitlement and tenure is shown in Adger et al. (2005) as critical for increasing rural communities' adaptive capacity. Increasing local community's entitlement to land and providing well defined land tenure would remove the dilemma of community's desire to be self-sufficient in food and income. Although the aim of the prevailing policy strategy is for the government of Tanzania to increase community's access to financial resources, without a well defined land rights and tenure, it will be difficult to attain this goal. For instance the government's efforts to introduce and promote cultural tourism along with wildlife tourism in NCA (as an alternative livelihood after failure of livestock) is an example of policy intervention intended to increase local community's access to financial resource. However, for the local community to be able to maximise benefits of tourism the community needs land for construction of low-cost lodges & restaurants. Low-cost lodges & restaurants is an untapped venture for the local community and would serve the low-income domestic visitors. Similarly, the provisions of subsistence food during crisis and income subsidy

to enhance community development are necessary policy activities to increase community's adaptive capacity. However, as shown in previous chapter, these provisions have not helped the community to offset damages caused by droughts. It is expected that land entitlement would enable local community to diversify into different business ventures to earn income. Likewise, land would be used as collateral for acquiring loans from the banks.

The inefficiency of NCA governing policies have seen local community using resources necessary for wildlife tourism to cope with stressors. This is dangerous for the future of wildlife tourism and it represents the failure of government's policies to achieve the goals of the multiple land-use system. Therefore this study strongly recommends that revisiting the current community development policies and implementing necessary amendments is vital. Specifically, this will involve revisiting the current policies and regulations to ensure that they are more responsive to the community's needs. In addition to improving land entitlement and tenure, particular emphasis should be on improving effectiveness of policies to ensure tourism contribution to local community is increased. The current set up of cultural tourism where the local community has no access to international visitors provides a loophole for to benefit from income which was intended for local community.

Although the majority of local community members appreciate the efforts made by NCAA to introduce cultural tourism as an alternative solution to dwindling livestock, the majority opined that the current contribution of tourism to their livelihoods is not sufficient to offset the impacts of drought. They mentioned various contributing reasons for tourism's insufficient contribution to their wellbeing: the local community members perceive that cultural tourism is not adequately promoted to international tourists and even where there is some promotions, members of local community are not involved; they lack direct access to international visitors; corruption practiced by some tour drivers; community are discriminated against by formal tourism employers and they consider the current proportion of tourism profit channeled by NCAA as inadequate. They felt that by imposing regulations for improving cultural tourism, their participation in tourism activities will increase and hence improve their income. The majority community members were of the view that if tourism would enable them to get all of their basic needs, they would not go for other livelihood alternatives, such as agriculture, which is considered incompatible with conservation and, actually, is not

their traditional mode of economy. This is an important area for policy intervention to remove obstacles to tourism's contribution to local wellbeing. The government would use these suggestions raised by local community to improve income contribution of cultural tourism.

During FGDs participants made the following suggestions:

- The current contribution of NCAA to community development be increased from the current figure (estimated to be less than 5%) to 40% of the total income from tourism;
- Maasai must have direct access to tourists and tour companies must include cultural tourism in their itineraries, so that tourists know in advance, and decide themselves what *boma* to visit and pay fees direct to the *boma*;
- Increased access to natural resources, especially land, in order to enable native residents to own their own tourism enterprises;
- Increase the involvement of native residents in formal employment; if education is a limiting factor, then employment that does not need formal education should be targeted, otherwise there must be strategies to improve education of the native residents.

Another area where the government policies are weak, include banning of crop cultivation without proposing an alternative livelihood option. The government uses restrictive policies to ensure that human activities are minimised for conservation of the ecosystem, wildlife and habitat. One of the restrictions is prohibiting local community from cultivation. This is another area that local community considers as an inefficiency of prevailing policies. Banning of agriculture without proposing alternative solutions is considered by local community as inhuman. This study strongly recommends that there is a need to amend these policies and clearly put forward new lines of livelihood that can supplement agriculture.

The majority of local community members consider agriculture as the reliable livelihood option – after failure of pastoralism – to satisfy their basic needs. However because of restriction, they urge government to improve income from cultural tourism, It is important for these community members however to understand that agriculture is also a sector considered as highly vulnerable to climate change, hence it might not be a

reliable future option. Similarly, the community needs to understand that agriculture may require the application of chemicals (insecticides and pesticides), which might be incompatible with conservation of wildlife. This implies that for them, tourism is the only reliable source of income as it is compatible with the environment. Such understandings need to be imparted to the community through environmental education. The GMP's strategy to impart to local community environmental education in the context of climate change is not clear and hence needs more improvement.

Education is another adaptation option that local community can capitalise on to enhance adaptive capacity. Education is particularly relevant because it increases the chances of employment in tourism and other sectors. Employment increases the income of local community members, thereby increasing their capacity to cope with droughts and other compounding stressors. However, although the GMP's emphasis on education of local community members is clear, it does not put forward clear implementation strategies to ensure that local community members are favoured in getting education and securing employment opportunities. This study therefore recommends that Tanzania's education policies must be amended to give education priority to people with special needs like the NCA local community. This should go along with favouring Maasai when employment opportunities are available.

This study also established that because climate change is not explicitly addressed in wildlife tourism, the benefits for the community from climate change have remained low. For instance, adaptation can be carried along with mitigation. Mitigation has potential application for reducing climate change consequences and can be considered as an opportunity for local community to improve their income, through carbon sequestration. NCA's forests have potential application for carbon sequestration but the current GMP remains silent. This can be an opportunity for local community to gain income. However it is important that the benefits of mitigation are investigated before putting this option into actions. The investigation will help to avoid disappointing local community as a result of assumption that the benefits of carbon sequestration are there while in fact they may not. Furthermore, this study noted that the current policies are silent about developing food and livestock insurance schemes to reduce food insecurity. This study recommends that it is high time that the government introduces insurance and compensation schemes to reduce vulnerability. Similarly, devising drought early warning systems could be an important policy intervention to enable

pastoralists and associated institutions to prepare for the consequences of severe and prolonged droughts. Currently the GMP does not provide a clear strategy about early drought warnings.

9.2.2 Increasing the adaptive capacity of wildlife resources

Wildlife seems to be more resilient than livestock as there was no evidence of deaths or mass extinction as a result of climate change. However, this is not to say that they are not or will not be impacted by climate change impacts. There are various ways in which wildlife can become vulnerable to these impacts: some people use wildlife, through poaching, to reduce their vulnerability; and other coping strategies that local community demand, including crop farming and land entitlements, can reduce the range size for wildlife, block wildlife migrations, increase disturbance and stress to wildlife, cause pollution (through herbicides) and consequently increase vulnerability of wildlife. Similarly, the current trend, where water availability continues to decrease in NCA, may also affect wildlife and increase their vulnerability. Likewise, huge livestock losses due to extreme droughts are a reminder that wild animals may also face the same catastrophe because they share the same ecosystem resources, especially water, forage and climate. Altered migration and breeding patterns is another reminder that wild animals are already facing the consequences of climate change, even though this is always considered as a coping strategy. All these areas need focus when designing adaptation strategies.

The NCA GMP comprises a wide range of activities necessary for conservation of wildlife and their habitat. Such activities include those related to: the use of education (both formal and indigenous knowledge) to enhance conservation; minimising impacts from human activities by imposing stringent restrictions; and addressing human population growth issues. All these activities are relevant to climate change adaptation. However, because there is lack of a clear climate change policy in wildlife tourism, most of these activities are not oriented towards climate change adaptation. As a result, their effectiveness in addressing climate change adaptation may need reorientation. As in human systems, this will need new policy orientation.

For instance, this study found that although current wildlife conservation policies encourage greater integration of traditional experiences and knowledge in enhancing

conservation, they are not clear about how such integration can be achieved. Prevailing restrictions of indigenous people to access certain resources or areas contradict NCA's strategy to integrate indigenous knowledge in conserving natural resources. Proper designation and implementation of policies that encourage the application of traditional knowledge and experience can be a basis for involving local community in conservation projects, and hence providing opportunities for increasing community income. This income can be used to reduce their vulnerability to climate change stressors. This study recommends that new strategies including identifying areas for tapping indigenous knowledge in conservation are required.

Similarly, NCAA has shown its commitment to address population issues by encouraging voluntary emigration of local community members. Addressing human population growth in conservation is absolutely compatible with climate change adaptation. However, as discussed in section 8.4.1, the term 'voluntary' relocation is not clearly explained to the community. As a result, voluntaryism creates tension between some local community members and conservationists, as the former perceives it as evicting them by force. This study recommends that a clear and carefully designed relocation strategy is needed. For instance, there are various ways through which voluntary removal can be achieved. This study noted that education is one of the best adaptation options relevant for relocation of Maasai. Education does and will encourage Maasai to move to other areas to seek employment. The study observed that most Maasai who reach high levels of education (mostly college and university levels) tend to search for employment outside NCA and they tend to migrate permanently. During FGDs participants were of the view that there was a special program conducted by NCAA that provided free Maasai with education from primary school to university levels. However, currently this program has been phased out and there was no hope for its renewal. This study recommends that if education along with employment is strategically designed, it can be a better option for reducing population in NCA. Similarly, family planning education to discourage Maasai from having many children can help to address population issues in NCA.

Protecting the environment (i.e. ecosystems and wildlife habitat) from negative impacts is one of the wildlife conservation strategies to ensure sustainability. One criticism of prevailing wildlife conservation strategies, as observed in this study, is the tendency to

focus more on halting negative impacts from human activities than climate change impacts. However, it is important for wildlife tourism managers and policy makers, to turn their thinking around and consider climate change as the most obvious threat to wildlife and habitat. It is well acknowledged that climate change will have direct or indirect impacts on wildlife species and habitat (Williams et al., 2008). This implies that restricting human activities is not the only adaptation measure to preserve wildlife and habitat. The impacts of climate change combined with those of human activities can cause far reaching negative consequences for wildlife, beyond the institution's capacity to control. Therefore, the role of policy makers is to anticipate these consequences and design policy interventions to prevent or deal with them, before they cause significant damage.

9.2.3 Increasing the adaptive capacity of tourism businesses

Unlike local community, tourism businesses were mainly affected by shocks that did not originate from NCA but from neighbouring countries. Although vulnerability of tourism businesses was not as high as that of local community, because of their higher adaptive capacity, adaptation for these businesses will be inevitable. Under severe future climate change scenarios vulnerability of tourism businesses may increase. They will need to orient some of their activities towards climate change adaptation.

Business adaptation can be utilised by tourism to deal with climate change (Fussel, 2007; Jopp et al, 2010; Scott et al., 2009). As presented in chapter two (section 2.4.4), these are techniques used by tourism operators, regional, government and tourism industry associations to reduce vulnerability to climate change. They involve adopting new pricing strategies, product/market diversifications and positioning. For instance, although no serious climatic shock has occurred in NCA, tourism business owners are aware that changes in wildlife migration, caused by droughts or low rainfall, may have serious impacts on tourist flow in the future. To deal with this issue, they expect to adjust the seasonal calendars and inform tourists about new changes. Nevertheless, this strategy will only succeed if regular changes occur in wildlife migration patterns. Otherwise, according to this research, the current pattern of drought occurrence is irregular and unpredictable and so too are migration patterns. As such, tourism

businesses will need new coping strategies with altered migration patterns if climate change continues in the future.

Policy adaption is also relevant for climate change adaptation in the tourism industry. In this study, it is noted that neither NCAA nor the hotels/lodges or guide companies in NCA have clear climate change adaptation policies for tourism. This makes tourism in Tanzania under-prepared for the future consequences of climate change. This study recommends a joint policy designed for climate change adaptation and this must include all NCA tourism stakeholders. It is from this policy that the issues of cross-border impacts of climate change can be addressed.

However, a question remains as to why prevailing policies seem to be insufficient in addressing climate change in local communities, tourism businesses and even in natural resources management. The answer to this question from the analysis of climate change adaptation modes is highlighted in the following section.

9.3 Improving the effectiveness of policy adaptations

As discussed in chapter two (section 2.4.4), there are two modes of climate change adaptation: autonomous and planned. Autonomous adaptation occurs when the system or an individual unit responds spontaneously after initial climatic impact manifests without the direct intervention of public agency (Fussel, 2007; Smit & Pilifosova, 2003; Smit & Wandel, 2006), whereas planned adaptation can be undertaken before the impact occurs and it can involve deliberate policy interventions.

The major drawback in government policy interventions in addressing climate change in many sectors is associated with the mode of adaptation that most conservation policies have been oriented towards (Fussel, 2007; Smit & Pilifosova, 2003; Smit & Wandel, 2006). It became clear during the assessment of adaptive capacity that most of the current Tanzanian policies are oriented towards autonomous adaptation. As a result, both human and environmental systems of wildlife tourism (i.e. local community, tourism businesses, government employees and wildlife and habitat) have been adapting autonomously. Although this mode of adaptation has proved successful under natural climatic variability and change (Fussel, 2007), Smit and Pilifosova (2003) argue that losses, resulting from extreme climate change and variability, may be extremely large

and overwhelm the capacity of autonomous adaptation to offset them. Studies examining adaption to climate change have consistently suggested that planned adaptation has the potential to offer effective alternative or supplementary adaptation solutions (Fussel, 2007; Smit & Wandel, 2006). The author of this thesis believes that policies oriented toward planned adaptation, if carefully designed, can work well with both human and environmental systems of wildlife tourism, to strengthen existing adaptive capacity and reduce current and future vulnerability. Table 9-2 presents some examples of areas on which planned adaptation can focus to reduce vulnerability.

Table 9-2: Some areas for planned adaptations to reduce exposure and sensitivity

System component	Exposure/sensitivity factors	Some areas for policy interventions to reduce exposure and sensitivity
Local community	<ul style="list-style-type: none"> ◦ Increased population size ◦ Location (marginal areas) ◦ Lack of entitlements and limited access to livelihood assets (particularly economic and natural resources) ◦ Limited livelihood options ◦ Ill-defined policies regarding use of natural resources 	<p>Adopt policies that:</p> <ul style="list-style-type: none"> • encourage negative growth of human population; • encourage relocation of people; • facilitate ecosystem restoration (e.g. reforestation, elimination of invasive species, and grass replanting); and • increase disaster preparedness (e.g. early warning); • redefine the patterns of resource use (e.g. water rights and credit availability); and • strengthen the implementation of policies that promote environmental education
Tourism businesses	<ul style="list-style-type: none"> • Destination location • Lack of livelihood diversification among newly employees • Seasonality • Marketing strategies 	<ul style="list-style-type: none"> • The key issue relevant for adaptation is for tourism enterprises and their workers to strengthen their strategies for preparedness through business and livelihood diversifications and increased access to credits; • Adopt cross-border/cross scale adaptation
Wildlife	<ul style="list-style-type: none"> • Increased human populations and activities • Diseases • Changes in vegetation/habitat loss • Climate change • Reduced water 	<ul style="list-style-type: none"> • Adopting conservation strategies that encourage restoration of the original grassland • policies that encourage negative growth of human population • Policies that restore vegetation and habitat • Policies that monitor responses of individual wildlife species to climate change and variability e.g. temperature variations • Research on water rights policies
Environment	<ul style="list-style-type: none"> • Increased human populations and activities • Changes in vegetation/habitat loss • Climate change • Increased tourism activities 	<p>Adopt policies that:</p> <ul style="list-style-type: none"> • encourage negative growth of human population; • encourage relocation of people; • restore the lost vegetation; and • strengthen climate monitoring systems

9.4 Future research to enhance the system's adaptive capacity

Undertaking this challenging study has not been an easy task. It has been a time, money and energy consuming study. Given the limited time and money and the broad scope of this research, some of the recommendations discussed in this chapter may need more detailed research. For example, this chapter has established that policy is the most influential adaptation strategy because most of the activities in the studied system are under government regulatory frameworks. This study recommends that policy amendments are needed in order to accommodate climate change issues that are not addressed in NCA prevailing policies. In order to make policies more effective in increasing the adaptive capacity of the studied system, the amendments of policies need to be well informed. This will depend on detailed research in the areas in need of adaptation. For instance, water availability and distribution in and of itself is a topic of research inquiry. To make policy redefinition more informed for water issues, more detailed research on water availability and distribution will be required. Currently, there is no such research conducted in the study area (URT, 2010).

Similarly, the implementation of proposed adaptation strategies will require a detailed environmental impact assessment (EIA). This study was based on the last EIA conducted in 2007 by NCAA. However, the EIA was confined more to the impacts of car congestion and the impacts of population increase on the environment, lacking a broad coverage of all aspects of the NCA tourism system. Similarly, since 2007 it is obvious that various changes have occurred. As such, it can be said that the current EIA report is outdated. This suggests that to ensure the implementation of the proposed strategies are more informed, a new EIA study is needed.

Likewise, the enhancement of resilience is a continuous process, and therefore future adaptations are inevitable. Predictions or estimates of likely future adaptations are an essential element of climate change impact and vulnerability assessment (Smit & Pilifosova, 2003). However, without a critical analysis of costs and benefits of adaptations, making future estimates adaptations will be extremely difficult. This study, therefore, recommends that a detailed research of costs and benefits of adaptations will be needed.

9.5 Chapter summary

This chapter has made recommendations for adaption strategies to improve the adaptive capacity of wildlife tourism in NCA. These adaptations are proposed based on the gaps identified during vulnerability and resilience assessment presented in chapters six, seven and eight. The intended outcomes from the proposed adaptation strategies include: increased adaptive capacity/resilience; decreased vulnerability to shocks and stressors; and identification of potential opportunities that may arise from adaptations. This chapter has presented a practical contribution to knowledge relevant to sustain wildlife tourism in the context of climate change adaptation.

To this end, the next chapter concludes this thesis by summarising the knowledge gained from previous chapters into a conceptual framework. This includes outlining all steps involved in the development of such a framework and the contribution of each step in closing the identified knowledge gap.

CHAPTER TEN: DEVELOPING A CONCEPTUAL CLIMATE CHANGE ADAPTATION FRAMEWORK FOR WILDLIFE TOURISM

10.1 Introduction

Despite the recognition that wildlife need to adapt to climate change, very little research has been undertaken on how wildlife tourism can adapt to climate change. As a result, the contribution of research on how wildlife tourism development can be sustained under climate change has remained elusive. In other words, climate change adaptation is not well integrated in sustainable wildlife tourism, and this is a major knowledge gap in the existing literature. This makes wildlife tourism less protected and under-prepared for the consequences of climate change.

The author of this thesis considered that the best way to address these challenges would be to propose a conceptual framework that will guide the process of integrating climate change in wildlife tourism. The development of this framework is motivated by the general lack of a robust framework to address climate change in wildlife tourism, particularly in Africa. To achieve this fundamental knowledge inquiry, five specific objectives were formulated: (1) to review the literature and identify the theoretical frameworks that address vulnerability and adaptation to climate change in tourism more generally, and use this review to develop a theoretical framework suited for wildlife tourism in Tanzania and Africa; (2) to describe the NCA's tourism system and identify the negative impacts (both shocks and stressors) that trigger the vulnerability of wildlife tourism; (3) to use the framework developed in the first objective to assess the factors that determine NCA's exposure, sensitivity and adaptive capacity to shocks and stressors; (4) to propose adaptation strategies relevant for increasing the adaptive capacity of wildlife tourism; and (5) to propose a new conceptual climate change adaptation framework that best captures the contexts of wildlife tourism in both Tanzania and Africa more generally. These objectives were operationalised in NCA, Tanzania, as a case study. This chapter responds to objective five (5) of this study, shown in table 10-1 below.

Table 10-1: Research objective addressed in Chapter 10

Research objective	What information is needed?	How information will be gathered	Why the method is appropriate
(5) Proposing a new climate change adaptation framework that best captures the context of wildlife tourism in Tanzania and Africa more generally	<ul style="list-style-type: none"> • Applicability of key elements of vulnerability assessment identified in the theoretical framework • Proposing new strategies for improving the adaptive capacity of the studied system 	<ul style="list-style-type: none"> • Integrating and presenting an outline of the information from research findings 	Helps to propose modifications of theoretical models to reflect the actual situations.

10.2 Revisiting research objectives

The development of a climate change adaptation framework for a complex coupled human environmental system, like the wildlife tourism system, requires a researcher to have prior knowledge of vulnerability assessment and adaptation. The literature review provided a fundamental source of such knowledge. It helped to accomplish the first objective from which all other objectives stemmed. In essence, the first objective helped to identify the knowledge gap and key elements for vulnerability assessment that other researchers have used to assess vulnerability and adaptation in other sectors. These elements provided useful tools for developing a methodology for assessing vulnerability in the study area. The second objective was intended to identify the negative impacts that have disrupted the studied tourism system over the past 25 years. This was accomplished by doing a critical case study analysis, where the tourism system was described, key players of the system and shocks and stressors were identified. The third objective was intended to assess vulnerability of the study area. Using key themes identified in the literature: shocks and stressors, exposure, sensitivity and adaptive capacity of wildlife tourism were assessed. Vulnerability assessment is a very crucial stage in any attempt to develop adaptation strategies for a particular system. It facilitates understanding of the most vulnerable areas, so that appropriate adaptation strategies can be developed to reduce their vulnerability. The fourth objective was intended to propose adaptation strategies appropriate to wildlife tourism based on vulnerability assessment and adaptation gap analysis. The fifth objective (as presented in this chapter) is intended to conclude the thesis by proposing a conceptual climate change adaptation framework

for wildlife tourism. This involves diagramming and outlining the whole process from Chapters 2 through 9.

According to Patterson (2006), a conceptual framework has many advantages including: encapsulation of shared knowledge; the identification of knowledge gaps; the extraction of knowledge from various stakeholders; provision of innovation and rethinking; and informing and extending the knowledge. According to Jopp et al. (2010) developing a framework involves not only presenting a diagram, but also outlining the steps involved in its development. Specifically this chapter presents: the diagrammed framework; an outline of how it was developed and how it contributes to addressing the knowledge gap. The proposed framework is named '*Wildlife Tourism Climate Change Adaptation Framework (WTCCAF)*'. Figure 10-1 illustrates this framework and the following sections present the discussion of each of key steps involved in its development.

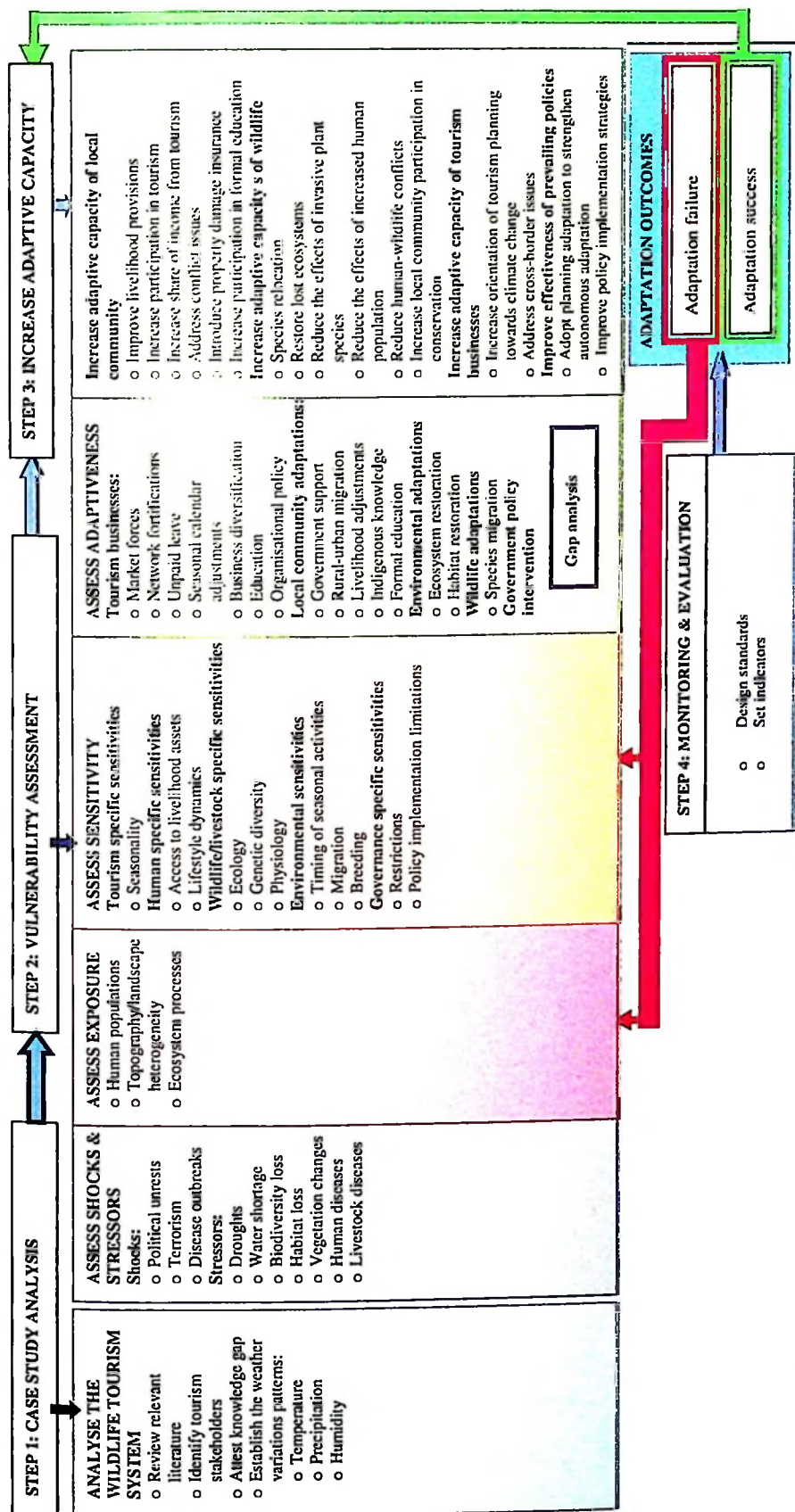


Figure 10-1: Wildlife Tourism Climate Change Adaptation Framework (WTCCAF)

10.3 Wildlife Tourism Climate Change Adaptation Frameworks

The development of this framework incorporates four major activities which featured most in reviewed climate change adaptation frameworks: (1) case study analysis, (2) vulnerability assessment, (3) improving adaptive capacity through adaptation, and (4) monitoring and evaluating adaptations. According to Jopp et al. (2010), the process of developing a conceptual climate change adaptation framework involves illustrating all steps involved in undertaking these activities in a studied system. This illustration can take any form, but each should aim to improve the framework applicability as well as our understanding of complex interactions (Jopp et al., 2010).

10.3.1 Case study analysis

There are two major purposes of case study analysis: (1) to analyse the studied tourism system (in order to understanding the boundaries and identifying key stakeholders), and (2) attest to the knowledge gap identified in the literature (i.e. to gain a preliminary understanding of the size of identified problem from the literature review) including understanding how the problem is applicable to the studied system. In other words, this helps to understand the extent to which a chosen case study truly represents the identified problem. Case study analysis is represented by step 1 in Figure 10-1.

Analysing the wildlife tourism system

The literature highlighted that vulnerability and adaptations are contextual issues and therefore it is important to have a thorough understanding of the context within which they are assessed (Adger et al., 2005; Calgaro et al., 2013; 2014; Jopp et al., 2010; Smit and Pilifosova, 2003). Understanding the studied system involves identifying: key components that constitute the system; and stakeholders who have direct or indirect influence in the functioning of the studied system (Jopp et al., 2010). This helps to know ‘who’ (the people directly involved) and ‘what’ (the features that constitute the biophysical environment) feature in the studied system. In this study this step helped the researcher to develop a preliminary understanding of the units of analysis and it formed a basis for selecting the units. Similarly, it helped to understand the system boundaries, including the nature of interactions between people (including people from within and outside the system), between people and environment, between people and wildlife, and between wildlife and wildlife. Reviewing the literature (both grey and academic), undertaking visits to the studied area and conducting preliminary interviews helps to

gain an understanding of the system boundaries and nature of these interactions. This also helps to link these interactions with exposures, sensitivities and adaptive capacity.

The analysis of the NCA wildlife tourism system enabled the researcher to identify stakeholders who have direct or indirect influence in the functioning of the system. These include national and multinational tourism and conservation stakeholders. Their involvement is important, because they may assist in providing expertise in various fields related to tourism, conservation and community adaptation to climate change. Others include local/domestic government institutions and non-governmental organisations (NGOs). Although not all of these stakeholders were involved in this study, they are important stakeholders to be consulted by managers and other actors who will use the developed framework to understand the vulnerability of a studied area and develop appropriate adaptation strategies. Given the nature and scope of this research, it is only those stakeholders who have direct influence in the studied system who were involved in this study. These included local community (i.e. the indigenous community), wildlife and habitat (i.e. wildlife and the environment), tourism businesses and government employees (conservationists/ecologists). Generally, these are the local level wildlife tourism actors.

Attesting to the knowledge gap

This research was conducted in NCA, Tanzania. This was the case study for this thesis. NCA is a protected area where conservation of natural resources, tourism and community development are concurrently done. The need to attain a sustained ecosystem, while permitting the indigenous people and wildlife to harmoniously co-exist in natural settings, is the main goal of NCA management.

The case study analysis indicated that NCA is a true case where the knowledge gap exists, and, as such, it is worthy of study. NCA is managed through the General Management Plan (GMP) 2006-2016 document. This is the key document through which all activities relevant to the conservation of wildlife, promotion of wildlife tourism, and development of the indigenous people are referred. The case study analysis indicated that the GMP echoes various policies developed for countrywide implementations. Unfortunately, climate change adaptation is not explicitly explained in this document. However, the case study analysis indicated that inadequate knowledge and capacity by managers, varying perceptions among managers about climate change,

and ill-defined national and sectoral policies in addressing climate change, has left the issue of climate change adaptation less addressed in the GMP. This omission has left wildlife tourism less prepared for predicted climate change impacts.

It is acknowledged in the GMP that research findings are an important tool to aid the management of wildlife tourism and associated natural resources (URT, 2011). The GMP acknowledges that, although NCA is one of the most studied protected areas in relation to resource management, climate change is less studied. Even where a few studies prevail, the managers of this area are concerned that most of their results lack focus and are presented in ways that do not encourage practical implementation (URT, 2011). This implies that these managers need well-focused research results that are easy and simple to implement. In this aspect, arguably well-focused research results are an outcome of the research design and undertaken based on current conservation and climate change adaptation frameworks.

It can be argued therefore that the development of this framework is driven by the need to ensure that climate change is integrated in wildlife tourism and that wildlife tourism managers are provided with a simplified working tool to aid combating the impacts of climate change. The major challenge is to develop a conceptual adaptation framework that is compatible with the context of wildlife tourism. The author of this thesis believes that integrating climate change adaptation in wildlife tourism could be simplified, if managers are provided with a unified framework that is developed from the knowledge of climate change adaptation and that of sustainable wildlife tourism development. Such a framework would be an invaluable way of improving the capacity of wildlife tourism managers and other actors in dealing with current and future negative impacts of climate change. To this end, the second step involves assessing vulnerability of the case study to climate change.

10.3.2 Vulnerability assessment

The literature has consistently emphasised the importance of undertaking vulnerability assessment prior to developing adaptation strategies (Smit & Wandel, 2006; Williams et al., 2008). According to Larsen et al. (2011) one of the approaches used to research vulnerability and resilience is by looking at the orientation of actors. This implies that the focus of vulnerability research is to understand how actors exposed to climate change risks are able or unable to deal with those risks (Klint, 2013; Larsen et al.,

2011). While the literature emphasises this approach, the knowledge of how best to undertake vulnerability assessment in wildlife tourism has remained elusive. This thesis reduces this knowledge gap by showing how best the wildlife tourism managers, amongst others, can undertake vulnerability assessment in wildlife tourism. The steps to be considered in the assessment of vulnerability, as applied in this research, are presented in the following subsections.

10.3.2.1 Literature review

The review of literature helps us to know what others have done and what knowledge gap remains unaddressed. While many practitioners tend to ignore this important stage, this thesis put more emphasis on its importance before data collection. Undertaking the literature review also helps to identify key emerging issues in vulnerability assessment. These in turn become useful tools to guide the process of vulnerability assessment. In this thesis the literature review incorporated identifying and reviewing the frameworks for climate change adaptation in the tourism sector. Various climate change adaptation frameworks were identified and reviewed. It became evident that these frameworks do not offer a clear understanding of the complex interactions between environmental/biological conservation, community development and tourism development. Therefore, a more focused framework was needed.

Given this need, the review of these frameworks helped to identify key vulnerability elements. These are the major determinants of and they provided guidance in vulnerability assessment. For instance, key elements such as *shocks and stressors*, *exposure*, *sensitivity* and *adaptive capacity* were identified from the reviewed frameworks and these were used as main themes to guide data collection and analysis.

10.3.2.2 Developing data collection methodology

Developing a data collection methodology prior to undertaking vulnerability assessment is important in order to ensure the collection of data that best address the problem. A methodology that is guided by pre-determined themes is deemed important. It is important to understand that the goal of methodology that is guided by pre-determined themes is not to produce a score, rating or ticking off the system's particular vulnerability (Calgaro et al., 2013a; Smit & Wandel, 2006). But rather, the purpose of such methodology is to utilise the pre-determined themes to collect as much information as possible on patterns of vulnerability, in order to identify ways in which the adaptive

capacity can be improved and vulnerability decreased (Smit & Wandel, 2008). Following the development of the vulnerability assessment methodology, the next step was to test/apply in the case study the identified themes.

10.3.2.3 Testing key vulnerability elements

This stage involved testing, in the study area, the themes developed from the literature review. According to Smit and Wandel (2006), in vulnerability assessment, the researcher does not presume to know the factors that determine vulnerability (i.e. exposure and sensitivity), nor does the researcher specify a priori determinants of adaptive capacity. But the researcher uses the pre-determined themes to develop a broader understanding of the mechanism within which vulnerability and resilience occurs. That said, the major task during data collection was to assess vulnerability and resilience factors available with respect to the system's exposure, sensitivity and adaptive capacity (see step 2 in Figure 10-2). Specifically this step aimed to: identify the *shocks and stressors*; and identify the factors that determine *exposure, sensitivity and adaptive capacity* to shocks and stressors of the studied units/system.

Identifying shocks and stressors

This step is extremely important in vulnerability assessment because it provides an understanding of the events that trigger vulnerability. Usually, vulnerability manifests itself after the negative events have occurred (Calgaro et al., 2013a, 2013b; Cannon et al., 2008; Jiang et al., 2011). The events provide a reminder about the extent to which a system is strong or weak in resisting negative events. These events are referred to as *shocks and stressors* (Calgaro, et al., 2013a, 2013b; Klint, 2011). In vulnerability assessment, it is important to identify and analyse them prior to the assessment of exposure, sensitivity and adaptive capacity. Analysing these events helps to answer the question 'to what' a studied object is vulnerable.

The identification of shocks and stressors in the studied system helped to identify the different patterns with which people and the system are affected by shocks and stressors. The analysis showed that across the system people and resources were affected differently by shocks and stressors because they have different exposures and sensitivities. Tourism businesses were more affected by shocks. Among them, tour guides were mostly affected by shocks. Conversely, local community members, the environment and wildlife were mostly affected by stressors.

The analysis of shocks and stressors indicated that local community in NCA were more affected by stressors. Specifically, recurrent severe droughts, low rainfall and water shortages were mentioned as being the stressors most affecting local community. Although this study established no significant impacts of these stressors on wildlife tourism, the speed and severity with which they affect local community presents a serious risk to wildlife tourism in the future. This is because these stressors affect the livelihood resources (mainly livestock) which community members use to cope during severe droughts. Therefore, due to this it is likely that people, in coping with the climate change, may over-use protected resources which are important for wildlife tourism.

Wild animals are also among the studied components of the wildlife tourism system. They play a major role in attracting tourists. However, these animals are facing the consequences of stressors. Specific stressors such as severe droughts, changes in vegetation, habitat loss and low rainfall were the stressors most reported to have impacted wildlife. The data analysis showed that altered seasonal migration and breeding patterns were the consequences of these shifts for wildlife. As in local community, this research found that currently there is no significant evidence of the effects of these stressors on wildlife tourism. Nevertheless, the participants of this research (mainly conservationists) are concerned that the speed with which the stressors continue to affect the ecosystem will affect wildlife tourism. Therefore, there is a need to halt these stressors before they severely impact tourism.

Understanding exposure, sensitivity and adaptive capacity

As shown in the literature: exposure, sensitivity and adaptive capacity are the three key determinants of vulnerability. Understanding them is central to vulnerability assessment. The purpose of this assessment was to identify key factors and processes that influence the exposure, sensitivity and adaptive capacity of the studied system to shocks and stressors. The analysis helps to direct appropriate adaptation strategies and to inform policy making.

Exposure: The assessment of the system's exposure involved listing all factors and/or processes that facilitate contact of people, wildlife and environment with shocks or stressors. The analysis identified destination location, increased human population, topography, heterogeneity and the ecosystem's functional characteristics as the major factors/processes that shape NCA's exposure to identified shocks and stressors. The

assessment was undertaken in order to understand how the presence of these factors and processes influences the exposure of tourism businesses, local communities, natural resources and the environment and government employees to shocks and stressors.

In terms of tourism businesses, the assessment indicated that the location of NCA increases its exposure to the impacts of shocks occurring in neighbouring countries. Being located at the Tanzanian border with Kenya, NCA was affected by these shocks faster than if it had been located some distance from the border. It was also shown that because of cross-border interactions with wildlife from these two countries, many tourists – especially those coming from the UK – tend to visit NCA through Kenya. Anything that threatens tourists in Kenya similarly threatens tourism in NCA.

The heterogeneity of NCA's topography was shown as another source of exposure to stressors. Heterogeneous landscape creates differential patterns of rainfall, vegetation and consequently the distribution of wildlife in space and time. There are areas which receive higher amounts of precipitation per year while others receive low rainfall. Usually, windward and mountain areas receive higher rainfall (1200–1600mm pa) and are characterised by green vegetation throughout the year. Leeward sides normally receive low rainfall (200–600mm pa) and are characterised by arid and semi-arid vegetation. The exposure of local community and their livestock to severe droughts occurs because the majority of its community members are located on the leeward side/arid and semi-arid areas. Normally, when a severe drought occurs, the leeward side dries quickly, vegetation is depleted and livestock die. The exposure of livestock is heightened by conservation restrictions that prohibit feeding in some green areas.

The analysis indicated that ecosystem functional relationships involve interactions between people and wildlife and between wildlife and livestock. These kinds of interactions encourage exposure of wildlife to human activities, such as retaliation, and may also expose livestock to predators.

The analysis also identified that the built environment may create a favourable environment, which increases the exposure of people and environment to various stressors. For example, the majority of local community members are located in grassland areas characterised by short grasses. These grasslands face significant infestations of invasive plant species that are unsuitable for feeding livestock. Infestation of invasive species reduces the range size available to livestock and this

increases the exposure of livestock to severe droughts. The analysis showed further that the invasive species are susceptible to wildfires. Wildfires are caused by pastoralists who want to eliminate the old pastures and encourage the regrowth of green areas. Similarly, exposure to wildfire of residential houses, belonging to local community members, may occur because most of the houses are found in these areas.

Sensitivity: Sensitivity is the second component of vulnerability. The assessment of sensitivity involved the identification and analysis of social, economic, political and environmental factors present to the people and wildlife prior to the occurrence of shocks or stressors. As in exposure factors, this sensitivity assessment was conducted with respect to the major tourism system components: local community, tourism businesses, wildlife/environment and government employees. For simplicity of analysis, the specific sensitivities that emerged from these components were classified as *human specific sensitivities*, *tourism specific sensitivities* and *environmental specific sensitivities*. The literature identified that there is sensitivity related to wildlife and livestock determined by species' internal factors such as physiological, genetic and ecological traits. Such sensitivity is termed as *wildlife/livestock species specific sensitivity*. However, due to lack of expertise in animal science, the assessment of species specific sensitivities was outside the scope of this thesis.

Tourism specific sensitivities: The assessment of wildlife tourism sensitivities involved the identification and analysis of tourism specific sensitivities. According to the literature review, tourism specific sensitivities can be caused by factors related to the type of tourism product, the mode of production and delivery of that product (Calgaro et al., 2013a). These factors include: destination image; tourism seasonality; destination location; travel choices and marketing strategies adopted by the respective tourism destination (Calgaro et al., 2013a). The data analysis of this study identified that among these factors only destination location and marketing strategies made a significant contribution to the sensitivity of the case study to shocks in NCA.

Being close to the border, the location of NCA increased the vulnerability of the destination to shocks (e.g. political unrest and disease outbreaks) which occurred in the neighbouring countries. Similarly the type of marketing strategies caused the destination to rely on international tourists. This disrupted tourism, when political unrest in the neighbouring country and global terrorism occurred.

Human specific sensitivities: the assessment of human specific sensitivities involved the identification and analysis of pre-existing social, economic, environmental and political factors that reduced or enabled people's capacity to cope with shocks and/or stressors. The people involved include local community and tourism business employees. In terms of the latter, this research showed that among the NCA tourism business operators, tour guides were mostly affected by negative events that occurred in the neighbouring country than other tourism enterprises. The research established that overdependence on international visitors and lack of business diversification among some enterprises employees increased their sensitivity to global terrorism and negative events (e.g. political unrest, civil wars and crimes including the abduction of tourists) that occurred in the neighbouring country. However, it was evident from the participants that some employees became vulnerable in some ways, while others were resilient to these shocks. The employees who did not have capital to diversify into other livelihood options were vulnerable, especially when they were given redundancy during adversity. In most cases these were newly employed staff. Employees who were more resilient were those who were aware of job disruption at any time. As such, most of them invested in other livelihood options (e.g. retail outlets and farming) prior to redundancy.

With respect to local community, this research showed that most community members are sensitive to extreme droughts. The sensitivity of these people is driven by limited livelihood diversifications. It was established that there are many factors that limit local community members to diversify their livelihoods. But lack of entitlements and limited access to livelihood assets (economic, human and social, physical and environmental) are the most apparent constraints.

Limited access to economic capital is another factor that heightens the sensitivity of the NCA local community members to droughts. It is widely accepted that access to economic capital depends largely on the strengths and quality of the prevailing livelihood activity (Cannon, 2008). This in turn is influenced by the availability of employment opportunities, access to credit and well-functioning life support systems such as marketing, infrastructure and communication systems. Currently, pastoralism is the dominant livelihood activity for this community, but it is not sufficiently contributing to economic capital because pastoralism is highly affected by drought.

This study showed that the majority of the NCA's local community members (if not all) have limited access to most life support systems.

There are various livelihood options available to local community that are used to improve access to economic capital, but Maasai consider these options as insufficient to protect them from crisis. These options include tourism, formal and informal employment opportunities and subsidies from the government. Tourism is providing significant support, but is considered inadequate to protect community members from adversity. There are limited employment opportunities for local community members because of lack of education qualifications. Social marginalisation – where Maasai are treated by employers as 'unreliable people' – is also a source of discrimination, preventing them from acquiring formal and informal employment in accommodation facilities. The income subsidy from NCAA is considered inadequate, by local community members, to offset the damage caused by drought. This research found no evidence of insurance or compensation for damaged property. Limited crop cultivation had been tried before and had shown good results; as such it is considered an excellent source of economic capital. But cultivation is considered inconsistent with conservation and was therefore banned. Banning of crop cultivation left community members less prepared to cope; hence this increased their sensitivity to droughts.

Similarly, limited access to human and social capital also increases the sensitivity of local community members to droughts. Knowledge is very important human capital but this research showed that most of the Maasai people have limited access to knowledge, especially formal education. This limits their ability to acquire formal employment which could help broaden their economic capital. Similarly, Maasai are rich in traditional knowledge but how it is applied or integrated in conservation is not clear. This narrows the ways in which local community members could be engaged in conservation and tourism projects. Access to social capital involves having access to information on risks and networks and groups. In terms of information on risks, this study showed that Maasai are less informed. There has been no established early warning system before a drought becomes a crisis. This leaves these people less prepared. In respect to networks and groups, Maasai are the most popular people who have traditionally utilised social networks and groups in order to cope with adversity. It was shown by respondents that having livestock was a major catalyst for social networks to persist. Although Maasai have high access to networks and groups, this

study indicated that currently these networks are unable to help Maasai cope with adversity. This is because many Maasai no longer own livestock. This increases their vulnerability to calamities such as severe droughts.

Moreover, limited or lack of access to physical and environmental assets was found to be a limiting factor for Maasai in coping with droughts. This study noted that Maasai considered land entitlements as the most reliable source of livelihood diversification. They are aware that land can be used as collateral or mortgage for accessing loans from the bank. But also one can establish a hotel or guest house for low income domestic visitors. Currently, Maasai are restricted from owning land because of conservation reasons. This limits them from having a wide range of livelihood options to fall back on during adversity. Similarly, this study noted that local community need access to physical assets in order to diversify. This should comprise a strong life support system involving well-functioning infrastructures, markets and communication systems. This study found that currently Maasai have access to communication systems (through mobile telephones and a local broadcasting radio) but they have limited access to infrastructures and markets. This reduces their chance to sell livestock before the tipping point of severe droughts.

This study also assessed how prevailing governance structures and processes influence people's access to livelihood assets. The study established that governance processes influence resources distributions among people and consequently the success or failure of their livelihoods. Where success is not seen, there might be a general lack of proper implementation of governance strategies. For example, the study revealed that while there is more resilience in conservation of natural resources and tourism management, in local community this resilience is not properly reflected. Many people from have continued to suffer from droughts due to lack of proper implementation of community development strategies. Therefore, it can be concluded that existing governance processes are not offering sufficient support to reduce the sensitivity of indigenous people to adversity.

Environmental specific sensitivities: this study established that environmental sensitivities are caused partly by increased tourism activities and partly by human population growth. The increase in tourism activities in the Northern Circuit of Tanzania has led to increased demand for campsites, water and number of vehicles in

the area. While increased demand for water is one of the causes of water shortages, increased campsites and congestion of vehicles have accelerated environmental stress, disturbance and death of wildlife.

With respect to human population growth, this research established that this growth facilitates exploitation of natural resources and consequently exposes the environment to stressors such as droughts, changes in vegetation and habitat loss. Environmental degradation emerges as the population increases beyond the destination's carrying capacity. A recent Environmental Impact Assessment conducted by NCAA indicated that NCA is only capable of carrying 25,000 (IUCN, 2012). The current population size of over 60,000 is far beyond NCA's carrying capacity, and this may have resulted in observed environmental degradation and habitat loss. Increased population may have also contributed to increased illegal activities, such as poaching, which subsequently contributes to biodiversity loss. Similarly, increased frequencies of wildfire incidences may have been caused by increased population size, and this may have exposed the environment to invasive plant species and soil erosion.

Adaptive capacity: In this study, the assessment of adaptive capacity of the studied system involved the identification of strategies used by tourism businesses, local communities, conservationists/government employees and wildlife to cope with negative adversities. The goal of this stage was to understand to what extent these components of the studied system are vulnerable or resilient to climate change. Generally the aim of this assessment was to understand the effectiveness of adaptation strategies available in coping with climate change impacts and where gaps exist, use the information gained to propose appropriate adaptation strategies.

The literature offers two main approaches for assessing adaptation: hazard-based and vulnerability-based approaches (Füssel, 2007). This study adopted the latter approach. According to Füssel (2007), the vulnerability-based approach is the most useful, as it helps to assess the effectiveness of available adaptation strategies and identify priority areas for proposing new adaptation strategies/interventions, particularly if: the current climate-related risks are not satisfactorily controlled; climatic stressors are closely related to non-climatic stressors; there are resource limitations in terms of time, money, expertise and data; the uncertainty about future climate change is very high. All these are relevant for this study.

In this study the assessment of adaptive capacity was done against a particular set of known types of adaptations. As shown in chapter two, there are various types of adaptations available in the literature. In assessing adaptive capacity, it is important to consider how these are applicable in the studied system. The aim is to foresee the likelihood of adopting adaptation strategies that are not currently available in the studied system, but that are available or applied elsewhere and deemed relevant for that system.

10.4 Increasing adaptive capacity

Proposing how the adaptive capacity of the studied system can be increased was another important step in the development of WTCCAF (see step 4 in Figure 10-4). Usually this step comes after the vulnerability or resilience of a system has been assessed, and adaptation gaps identified. Adaptation gaps can be identified by evaluating the existing adaptations against the different types of adaptations available in the literature (i.e. policy adaptation, technical adaptation, business management adaptation, behavioural, research adaptation, education adaptation and autonomous and planned adaptations). It is important to note that there are contextual variations between various components that make up a studied system. Therefore it is recommended that the analysis of adaptation gaps is made based on the context of each system component, so appropriate adaptations can be proposed and directed to suit a particular context (see step 3 in Figure 10-1). Similarly, it is important to consider that since this study just proposes a framework of how vulnerability and adaptation in wildlife tourism can be assessed, it might not capture all aspect of vulnerability and adaptations available in the studied system. Therefore, this study suggests that managers have to undertake critical research of every aspect of the system prior to the implementation of this framework.

10.5 Monitoring and evaluation

Monitoring and evaluation involves getting feedbacks of implemented adaptation strategies. It is represented by step 4 in Figure 10-1. It involves putting into action monitoring and evaluation plans. This is achieved by developing standards and indicators. Monitoring and evaluation are arguably the most important aspects of climate change adaptation, but they have often been overlooked by many researchers (Calgaro et al., 2013b; Larsen, Miller, & Thomalla 2009; Moser & Ekstrom, 2010).

Monitoring and evaluation can help to understand the consequences/outcomes of taking adaptation actions, inactions or failed actions in a given system.

In developing the adaptation framework for wildlife tourism, monitoring and evaluation stages are critical because they measure the capacity of the respective institutions in dealing with social and environmental consequences of climate change. This is considered necessary to deal with complex and uncertain problems (Moser & Ekstrom, 2010). It is important to note that not all adaptations will be successful. Some adaptive actions may become maladaptive (Barnett & O'Neil, 2010; Moser, 2010). Sometimes adaptation may be successful but success may not be immediate (Jopp et al., 2010). Therefore, monitoring and evaluation needs to be continuous to ensure that necessary adjustments are made. Generally, monitoring and evaluation help to: identify new adaptation requirements, assess the success, failure or extent (levels) of implemented adaptation strategies; assess the types of adaptation that are appropriate for a given system; decide whether to continue, abandon or change the strategy. In this aspect, monitoring and evaluation are critical aspects of adaptive management that aid in making decisions and consequently avoid resource misallocations.

10.6 Contribution of the new framework to knowledge

The development of this framework has provided a new approach to building the capacity of wildlife tourism managers in dealing with current and future negative impacts of climate change. Specifically, the framework is a timely opportunity that provides wildlife tourism managers with a supplementary tool for managing natural resources and wildlife tourism, especially in the context of climate change. It is holistic in nature and thus it brings wildlife tourism sustainability research into the wider debate on how best to achieve sustainability in such a dynamic and complex coupled human-environmental system. However, understanding the contribution of this framework to the body of knowledge requires the need to identify the actors who may benefit from it.

The framework presented in this thesis makes a significant theoretical and practical contribution to sustainable wildlife tourism research. Wildlife tourism managers, conservationists, climate change researchers, policy makers and others can apply this framework in their fields. Specifically, it is in line with what natural resource managers are doing in the field. It builds on existing knowledge of conservation, tourism management and community development. It is a practical tool because it can be used to

guide the assessment of vulnerability and resilience of any tourism destination, system or any sector of an economy such as agriculture and forestry. It is a real practical tool because it is developed by integrating knowledge from literature and field context. As a theoretical tool, the framework can be used as reference material by students and researchers who would like to understand how the assessment of vulnerability and resilience to climate change can be undertaken.

However, there are four criteria put forward by Guba & Lincoln (1994) and also echoed in Bryman (2001) for judging the quality of a qualitative research: credibility, confirmability, dependability and transferability. I consider this research as of good quality because the four criteria were taken into consideration when designing and executing this research. Credibility requires that the results are credible (i.e. the results make senses to a wide range of study participants). Credibility can be achieved by applying a variety of data sources (Bryman, 2001, 2006). From this argument, I consider the findings of this thesis as credible because I used a variety of data sources (including primary and secondary sources) On the other hand confirmability refers to how conduction of the research minimised biases/subjectivity of the researcher (Guba & Lincoln, 1994). In this research biases/subjectivity minimisation was achieved through the use of various data collection methods (e.g. FGDs, Observation, Interviews, and Informal conversations). Similarly, dependability refers to the stability of the data findings if the research is repeated. However, a complete replication of the research may not be guaranteed since vulnerability and adaptations are context- specific and dynamic, and they vary both over time and space. Finally, transferability entails the ability to apply the research findings into other contexts, taking into consideration the contextual and dynamism of vulnerability.

10.7 Limitations of the framework

It is important to note that this framework is developed from a single case study. One important criticism of a single case study is uncertainty related to generalisation. Although many scientists advocate for research that can be generalised, this does not preclude research conducted to understand context based phenomena (Flyvbjerg, 2006). As climate change vulnerability is a context specific phenomenon, it might be that the framework developed in this study does not apply to all wildlife tourism systems.

However, this should not preclude testing the framework in other areas where other researchers will find it applicable (Klint, 2013).

In addition, scientists acknowledge that at no time will a framework diagram be able to include everything that can be studied from the complexities and dynamisms of real life, but applying the framework may assist destination managers, policy makers, researchers and others actors to identify opportunities for where adjustment and transformation can be made to the system, through adaptation to build resilience to climate change (Klint, 2013).

10.8 Chapter summary

This chapter has addressed the fifth objective of this thesis. It has proposed a conceptual climate change adaptation framework for wildlife tourism. The aim of this framework is to contribute to knowledge, and more specifically to improve the capacity of wildlife tourism managers, policy makers, researchers and other actors for integrating climate change in wildlife tourism. It has outlined the process involved in the development of such a framework. Proposing this framework is an attempt to bring the knowledge of climate change adaptation down to the local level, and by doing so it addresses the knowledge gap that exists in wildlife tourism. Similarly, the outlined steps are an attempt to equip wildlife tourism managers, researchers, policy makers and other actors with the knowledge of mainstream climate change adaptation in conservation and wildlife tourism.

Grounded in current climate change vulnerability assessment and adaptation frameworks from the theory, four main steps to integrating climate change in wildlife tourism were proposed: case study analysis; vulnerability assessment; improving/increasing adaptive capacity; and monitoring and evaluation. In essence, the first step, case study analysis, is meant to emphasise the need for gaining detailed understanding of a studied unit/system, and attest to whether the problem identified is real, before embarking on vulnerability assessment and adaptation. Other frameworks have overlooked this important step. The second step is meant to assess the vulnerability to climate change of wildlife tourism. One important aspect of vulnerability assessment in this framework, which other researchers have overlooked in their frameworks, is the emphasis on undertaking the literature review before implementing the framework. This helps to refine the methodology for undertaking

vulnerability assessment. Although a researcher may have his/her own ways of assessing vulnerability, in this thesis a methodology guided by pre-determined themes adopted from other frameworks was used. It is believed that this method helps to capture as much information as possible to understand vulnerability, and this brings the importance of the prior literature review to the fore. The third step is meant to propose ways of minimising vulnerability based on the context considered. The fourth step is meant to place emphasis on the importance of monitoring and evaluating adaptation strategies. The framework is unique as it combines knowledge from both human and environmental systems.

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APPENDICES

Appendix A: Research ethics and compliance

Compliance to the research ethics was one of the prerequisite for undertaking this PhD study. The role of the research ethics and compliance is to ensure that the research is conducted in accordance with applicable values and principles: regulations, laws, and by-laws and policies. These principles apply to all stages of the research, including when designing, conducting and reporting research findings. To ensure that this study is undertaken ethically all reasonable ethics steps were taken. These steps include: the application for ethics approval at Victoria University (VU), Australia (the institution responsible for this research) and the application for permit to conduct the research at Ngorongoro Conservation Area.

Appendix A-1: Ethics application and approval at Victoria University

Victoria University requires that all human research conducted should reflect the following values:

Respect for human beings – adherence to this requirement will ensure that the privacy, confidentiality, and cultural sensitivities of research participants are observed. This ensures that all people involved in the research have the right to make informed decisions about their participation in the research. This ensures that they make consent declaration when providing information about matters that affect them.

Research merit and integrity—this requires the methods, facilities and resources used are appropriate to achieve the aims of the research. Benefits of research must be justified, it should be supervised by researchers with appropriate expertise, and findings reported accurately and responsibly.

Justice – this requires that the procedure adopted in recruiting participants is fair and that the benefits of the research will be distributed fairly between participants and the wider community, and the research findings will be provided within a reasonable time.

Beneficence—this requires that sensitive issues regarding the welfare and interests of participants, and the cultural and social implications of the research are given due consideration before the research is undertaken. Any risk of harm or discomfort to research participants must be clarified.

Appendix A-1-1: Permit to conduct research at Ngorongoro Conservation Area



Ngorongoro Conservation Area Authority

Ref. No. NCAA/D/240/VOL. VIII/163

Date: Nov 23rd, 2010

Director General
Tanzania Wildlife Research Institute (TAWIRI)
P.O. Box 100
ARUSHA

RE: FREE PERMIT.

Reference is made to your letter with Ref. No. TWRI/RG/VOL.27/88/51 dated Nov 18th, 2010 regarding the above mentioned caption.

The Ngorongoro Conservation Area Authority has granted a free entry permit to Nickson Peter Mkiramweni, the research scientist who is conducting a research titled, "*Sustainable Tourism Development and Climate Change Adaption in Africa*" to enter and work within NCA for the period ending November 17th, 2011.

Kindly, rules and regulations of the Park should remain the same.

Regards
NGORONGORO CONSERVATION AREA AUTHORITY


Moinga Lesasi
for; CONSERVATOR OF NGORONGORO

Cc: - In charge Loduare gate
 NCAA.
 - In Charge Naabi Hill gate
 NCAA.

Head office P.O. Box 1 Ngorongoro Crater Tel. +255 27 2537006/19 Fax +255 27 2537007
Direct Line +255 27 2537046
Email: ncaa_laru@cybernet.co.tz Telegram NGOROASHIA
Liaison Office P.O. Box 776 Arusha Tel. +255 27 2503339 Fax +255 27 2548752
Information Office Tel. +255 27 2544625 Fax +255 27 2502603

All official correspondence should be addressed to The Conservator of Ngorongoro

Ethics application at Victoria University followed a series of paper works where various forms were filled by the researchers and the principal supervisor. The research aim, questions to be asked and recruitment procedures were clarified. Adherence to the institutional requirements

about where the data collection was to be conducted was also clarified. The VU Ethics Committee reviewed the application and finally approved it. The ethics approval reference number for this thesis is **HRETH 10/159**.

Information about ethical procedures at VU is available at <http://www.vu.edu.au/our-approach/research-conduct-ethics/human-research-ethics>.

Appendix A-2: Ethics application and approval at Ngorongoro Conservation Area

Application for the research permit to conduct research at any of the Tanzania's protected areas is one of the critical ethical issues a researcher has to comply with before undertaking the research. This applies to both international as well as domestic researchers. The Tanzania Wildlife Research Institute (TAWIRI) the institution responsible for reviewing, approving and issuing the permit. The review and approval of the permit application is done by TAWIRI in collaboration with the Tanzania Commission for Science and Technology (COSTECH) and the park or reserve from which the research is to be conducted.

The application for research permit at Ngorongoro followed a series of procedures as outlined in TAWIRI's website: <http://www.tawiri.or.tz> and COSTECH <http://www.costech.or.tz>. Key requirements that the permit applicant has to adhere to are listed in these websites. Finally, the application was approved and the permit issued. A permit was issued shown in Appendix A-1-1.

Appendix B: Data collection structure

As discussed in chapter four, there were two main methods of data collection: In-depth interviews and focus group discussion. Observation and informal conversations were also used to supplement the data. Appendices B-1, B-2 and B-3 are the questions and procedures used to collect the data used in this thesis. There were two phases of data collection as shown in Appendix B-1 and Appendix B-2.

Appendix B-1a: Phase 1 data collection, January to May, 2011

Stage 1: Case study analysis: Understanding tourism system

Task	Purpose
Day 1 - Introduction to the NCA authority:	<ul style="list-style-type: none"> • Self-introduction; • Introduce the project to the NCAA; • Introduce the project aim, objectives and scope; • Explaining what the project would like to learn from the authority; • Explaining about the ethical issues adherence including confidentiality and freedom to withdraw at any time; • Familiarization with other NCAA staff – the top authority to take a lead; • Familiarization with NCAA headquarters and surroundings including visiting the library, visiting the restricted, unrestricted areas and understand the right of the researchers - dos and undoes; • Understanding the full geography of the NCA – including choosing the villages to visit; • Seeking consent from the research participants and appointment for further consultations; and • Conclude the visit.
Day 2: Scoping	<ul style="list-style-type: none"> • Solicit and review various documents in the library (reports, brochures, leaflets, published and unpublished articles);
Day 3: Field visit	<ul style="list-style-type: none"> • Visit the hotels: self-introduction, introduce the project - including the project aim, objectives and scope; • Explain what information needed; • Seek consent of participation and make appointment for data collection.
Day 4: Field visit	<ul style="list-style-type: none"> • Visit the cultural <i>bomas</i> (cultural tourism centers) – introduce the project aim, objective and scope; • Seek appointment for data collection; • Visit the villages to observe the village life and surroundings/environment; • NOTE: Cultural <i>boma</i> were chosen as the centre for collecting data from local community.
Day 5: Visit Ngorongoro crater	<ul style="list-style-type: none"> • To observe wildlife, their activities and habitat

Stage 2: Understanding shocks and stressors, exposure, sensitivity and adaptiveness

Appendix B-1b: Data collection methods: *In-depth interviews*

	Target population		Local community	Conservationists
Research theme	Tourism enterprises			
	Checklist questions			
Shocks and stressors	<ul style="list-style-type: none">• What events have affected your business in the past 20 years?• In your opinion, what event (s) do you consider as the most risky to your business in the future?• Have you experienced any loss from the events you mentioned? – close ended question• What types of loss?	<ul style="list-style-type: none">• What events have affected your livelihoods in the past 20 years?• Have you experienced any damage from the events you mentioned? – close ended question• What types of damage?• In your opinion, what event do you consider the most risky to your livelihoods in the future?•	<ul style="list-style-type: none">• What events have affected wildlife and their habitat in the past 20 years?• What events have affected your efforts to promote local livelihoods in the past 20 years?• What events have affected tourism in the past 20 years?• In your opinion, what event (s) do you consider the most risky to conservation in the future?	<ul style="list-style-type: none">• What was the condition of the natural environment before the wildlife tourism development has gained momentum?• What changes have you observed over the last 20 years?• How are the changes related to the damage you have mentioned• Are there any physical features that accelerate the damage you mentioned?• How did wildlife sustain the negative events you have mentioned?
System exposure	<ul style="list-style-type: none">• What led to the loss you have mentioned?• Are there any physical features that contributed to accelerate the events you mentioned?• How did you sustain the loss from the negative events you have mentioned?• Are there any barriers to your efforts to adapt to the negative impacts?•	<ul style="list-style-type: none">• What was the condition of the natural environment before wildlife tourism development• What led to the loss you have mentioned (if any)?• Are there any physical factors that accelerated the events you mentioned?• Are there any barriers to your efforts to adapt to the negative impacts?• How did you sustain the loss from the negative events you have mentioned?• What was the condition of the	<ul style="list-style-type: none">• What was the condition of the natural environment before the wildlife tourism development has gained momentum?• What changes have you observed over the last 20 years?• How are the changes related to the damage you have mentioned• Are there any physical features that accelerate the damage you mentioned?• How did wildlife sustain the negative events you have mentioned?	

			natural environment before wildlife tourism development has gained momentum?	
System sensitivity	<ul style="list-style-type: none"> • What type of destination is the NCA? • Who are the main markets for the destination and why? • What are the main tourism seasons in NCA? • Is your business affected by tourism seasonality? 	<ul style="list-style-type: none"> • What are your main livelihood options? • How is tourism important to you? • Have you experienced any damage from the events you mentioned? • What type of resources do you need to support your livelihoods? • Are there any barriers for you to access resources? • What training and skills are available for you? 	<ul style="list-style-type: none"> • What type of destination is NCA? • Who are the main markets for the destination and why? • Have you experienced any damage from the events you mentioned? • What resources do you consider as the most threatened by the events you have mentioned? • What training and skills are available for you? 	
System adaptiveness	<ul style="list-style-type: none"> • Are there any local, national and/or regional emergency recovery plans in place? • How these plans do helps you to adapt/cope with the damage you have mentioned? • Are you involved in deciding what to include in those plans? • Are you aware of any institutional or national policy regarding climate change? 	<ul style="list-style-type: none"> • Are there any local, national and/or regional emergency recovery plans in place? • How these plans do helps you to adapt/cope with the damage you have mentioned? • Are you involved in deciding what to include in those plans? 	<ul style="list-style-type: none"> • Are there any local, national and/or regional emergency recovery plans in place? • How did these plans help you to protect wildlife from the damage you have mentioned? • How did you help local community members survive the damage you have mentioned? • Who is responsible to develop those plans? 	

Source: Adopted from Calgaro (2010) and Klint (2013)

Appendix B-2: Phase 2 data collection, January to May, 2012

Data collection methods: Focus Group Discussion, Informal Conversation and Observation

Data collection method	Procedures & checklist questions online
<p>Focus Group Discussion (FDG)</p>	<p>Target participants: <i>Local community</i></p> <p>Process:</p> <p>Before commencing discussion</p> <ul style="list-style-type: none"> • Small talk • Moderator (the researcher) and participants to agree on the number of people needed (normally 6 – 10) and time to finish (normally 1 hour) • Moderators to talk a little bit about group discussion and its importance • Self-introduction • The researcher to introduce the project aim and objectives • Ask if the project aim and objectives are understood • Clarify ethical issues: confidentiality, freedom of speech, freedom to withdrawal – before or at any time during the discussion and freedom to call the researcher after discussion (if there was any sensitive issue that couldn't be discussed in the group). • Moderator and participants to set and agree ground rules: moderator to insist on the freedom of speech e.g. there are no wrong or right answers, moderator to introduce the issue of recording and its importance, then, seek permission for recording from participants (most participants didn't like this), whether there was any need to switch off or leave the mobile phones on (e.g. why a participant should someone leave his/her mobile phone on while the discussion is going on?, if there's necessity to leave the phones on, what could be the best approach to pick the phone without disrupting the discussion?) and finally moderator to ensure that no few people dominate the discussion. <p>During the discussion</p> <p>Checklist of lead topics and questions to be used e.g.:</p> <p><i>Livelihood activities:</i></p> <ul style="list-style-type: none"> • Can someone tell us how local community members participate in tourism? Encourage many people to interrupt discussion by supplementing or providing alternative answers. Before concluding the discussion,

	<ul style="list-style-type: none"> • Ending conversation: Normally there's no formal ending to show that the discussion was not intended for research purposes.
Observation	<ul style="list-style-type: none"> • Things to observe: changes in environment, changes in practices e.tc. Normally the researcher has a diary for recording this as he observe, and a camera to take photos. The researcher can seek clarification of the observed phenomenon from the research assistant (if there is any) who is familiar with the area. This, then change into an informal conversation.

Appendix C: Policy analysis

Appendix C-1: NCA governing policies, legislations and acts

Policy and Legislation	Overall objective	Strength and weaknesses
Wildlife policy of 1993 Wildlife Act	To enhance the conservation of wildlife populations (with emphasis on threatened, endangered or endemic species), their habitat, areas of scenic beauty, water catchment and soils.	<p>Strengths:</p> <p>The policy acknowledges that illegal utilization (poaching) of wildlife resources is the major challenge facing conservation. The policy outlines strategies for combating poaching in protected areas. This is important for ensuring sustainability of wildlife and associated natural resources.</p> <p>It recognises that women & children are the most disadvantaged group in terms of education, leisure and enjoyment. Similarly, it acknowledges that women and children are the most vulnerable groups to diseases caused by poor nutrition and health care. It lists the appropriate strategies for reducing vulnerabilities of local communities, including women and children. It stresses greater involvement of rural communities (both men & women) and private sectors in wildlife conservation and benefits sharing; it recognises that increasing access to training opportunities for wildlife conservation staff and the community at large is a way of enhancing the human capital, strengthening local community networks (social capital enhancement); and promoting the use of indigenous knowledge in conservation. The policy encourages establishing Wildlife Management Areas (WMAs) outside protected areas to enable local communities can exercise conservation (through Community based Conservation) and reap the associated benefits; and lastly the policy encourages greater involvement of women in conservation projects.</p> <p>Weaknesses:</p> <p>Although the Tanzania wildlife policy identifies poaching as the main wildlife conservation challenge, it does not clearly outline the possible causes of poaching. This has resulted into poor designing of strategies to combat the problem. For example, this study showed that climate change is among the factors that cause many people from local community to engage in illegal utilization of wildlife resources. However, the current policy document, as reflected in the NCA GMP, does not mention climate change as a threat to conservation. This may leave the wildlife sector less prepared from both the current and future climate change risks;</p>

The policy outlines establishing the WMAs as a strategy for enabling the local communities participate in, and enjoy the benefits of conservation but this study noted that the involvement of the NCA local community (Maasai) in WMAs is ill-defined. As a result many Maasai are not benefiting from this opportunity. This may leave these communities with limited resources required to resist climate change adversities;

The policy considers involving women in projects as a way of reducing women and children vulnerability. However, the policy is unclear about the type of projects and how women can be involved. This study noted that women in the NCA have continued to suffer from lack of reliable sources of food and income. This has resulted into household food insecurity (especially during crises), inability to meet health costs and poverty more generally. For example, as stated previously, many of the children suffered from starvation and malnutrition while others succumbed because of poverty;

Likewise, the policy recognises that women are disadvantaged in terms of education. However, the policy does not provide clear strategies to deal with this problem. As a result many women (as well as men) in the NCA have continued to be behind in terms of education comparing with other ethnic groups in Tanzania. This research noted that most Maasai have only completed primary education because they cannot afford secondary education costs. This limits them from acquiring formal employments. Many employers, (especially accommodation, tour guiding and other sectors), require a candidate to be proficient in English language or at least reach secondary school level. Because of this, many Maasai have remained inflexible in terms of employment and, hence, susceptible to severe droughts;

The policy prohibits crop cultivation in the NCA for wildlife conservation purposes. However, the policy does not provide clear information on what alternatives there are for residents that would be interested in agriculture (UNESCO, 2010), especially during this period where livestock is not a reliable livelihood activity. As a result many local residents suffer during droughts because of the lack of alternatives; and

The policy emphasise on promotion of local knowledge in conservation. Unfortunately, during data collection, many respondents complained that their involvement in conservation is not clear. They voiced opinions that the use of traditional knowledge could create employment opportunities and these do not require a job candidate to have formal education. The following statements were captured during one of the focus group discussions sessions.

Tanzania Development vision 2025	To enhance the achievement of high quality livelihoods, good governance and the rule of law; and a strong and competitive economy.	<p>'... I have concern on conservationists who think that by being educated they can conserve without involving us [...], we are renowned for our experience of living with animals [for a long period of time] We have a lot of traditional knowledge and cultural values attached to certain animals and plants which prohibit us from killing or destroying them because from our traditions it is a sin to do so, but instead of collaborating with us they regard us as threats to our own environment. How can I be a threat of my own environment? [...]' (a participant from Moklal village).</p> <p>'We have abundant knowledge of conservation that's why we are here. If this gets someone to promote, it can be a best way of involving us in conservation and a major means of employing our people ... yeah not just say involving [us], we need benefits from that [involvement]' (a participant from the cultural boma).</p> <p>Strengths: This development guideline emphasises: self-sufficiency in food, food security and access to education; reducing gender equality and women empowerment, access to high quality health care, reducing infant mortality and absence of abject poverty for all Tanzanians. Similarly, the guideline emphasises the rule of law and absences of corruption at all levels. Moreover, the guidelines target diversification and investment in semi-industrial economy and improved infrastructures in order to attain an economic growth rate of 8% per annum. All these strategies are best suited for reducing vulnerability of wildlife, environment and local communities if careful implemented.</p> <p>Weaknesses: The information provided in the guideline is mainly designed for improving the economy at the national level. As such, it is unclear about how the above strategies could be implemented at the local levels. This is particularly the case of NCA where many local communities are prohibited from cultivation and they are unable to meet education and health costs. As a result malnutrition, poor health and poverty because of limited diversification are evident among the NCA local community members.</p> <p>During the focus discussions, participants reported there are many cases where drivers/tour guide seek corruption for them to deploy tourists to the cultural <i>bomas</i>. Presence of corruption reduces revenues from tourists to local community and this is an indication of ill-defined corruption reduction strategy in the NCA.</p>
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National Strategy for Growth and Poverty Reduction - 2005	To enhance growth of income and reduction of poverty; improved quality of life and social wellbeing; and achieve good governance and accountability.	<p>Strengths: The strategy recognises that rural and urban consist of communities characterised by income and all types of poverty (illiteracy, poor health services, poor social services, and inequality) and therefore it outlines strategies for combating them. The strategies are more or less the same as the Tanzanian Development Vision 2025.</p> <p>Weaknesses: The strategy is operational in Tanzania since the 2000s. However, this study noted that there is poor implementation of these strategies as a result the NCA community have continued face serious challenges related to poverty including illiteracy, poor health care, lack of social protection, water shortage, malnutrition and starvation.</p>
National land Policy - 1995 and Land and Village land Act	'To promote and ensure a secure land tenure system to encourage the optimal use of land resources and to facilitate broad-based social and economic development without endangering the ecological balance of the environment'.	<p>Strengths: This policy recognises the importance of land tenure on individual's development. Many interviewees during this research opined that a reliable land tenure is the mainstay of many (if not all) types of investments. The policy respects the ecological balance and environmental integrity. Given the fragility of the NCA ecology and environment, securing land tenure within the NCA (for Maasai) is considered incompatible with conservation (URT, 2010). In recognition of this, the NCA, through this policy, has designed strategies for ensuring that the NCA local community/indigenous people acquire land outside the NCA (UNESCO, 2010). This is done by encouraging people to voluntarily migrate out from the reserve.</p> <p>Weakness: The policy is not clear about people residing in the NCA as they face different circumstances from other Tanzania. As a result, the GMP information is not clear about what incentives are for the people to voluntarily migrate out. As a result many people have remained in the NCA where land tenure is restricted. Because of this, many Maasai have continued to suffer the consequences of droughts due to lack of diversification.</p>
Agriculture and livestock Policy 1997	To improve the wellbeing of the people whose principal occupation and way of life is based on agriculture.	<p>Strength: This policy recognises that most of the rural people are smallholder and livestock keepers, who do not produce surplus. Therefore the focus of this policy is to transform into commercialized agriculture so as to increase income of the people involved in agriculture. This focus is best suited for reducing vulnerability of NCA local community to natural hazards as increased income may warrant diversification.</p> <p>Weakness:</p>

National Tourism policy - 1999	<p>Seek to assist efforts to promote the economy and livelihoods of the people, essentially poverty alleviation, through encouraging the development of sustainable and quality tourism that is culturally and socially acceptable, ecological friendly, environmentally sustainable and economically viable</p> <p>Sought to market Tanzania as a favoured tourist destination for tourism and adventure (wildlife safari).</p>	<p>The policy is not clear on how commercialization can be achieved in such a delicate environment like NCA. It does not provide alternative solution to people facing land tenure problems like the NCA local community. As a result this policy is poorly echoed in the NCA GMP. This may result into lack of diversification and hence vulnerability to disasters.</p>
		<p>Strength: The policy recognises the importance of using tourism to improve people's livelihoods especially the poor. It recognises the necessity of using sustainable tourism practices (low impacts tourism). It puts clear strategies on the how the local people can benefit from tourism e.g. through community based tourism (CBT). It recognises cultural tourism as one of the means to enforce CBT. This study noted that the benefits of CBT implementation in the NCA are evident. The CBT, which is practiced in <i>cultural bomas</i>, have seen many Maasai participating and reaping the benefits thereof. However, for tourism to provide more benefits to the Maasai, there are many concerns raised during FGD that the policy is weak and need urgent actions.</p> <p>Weakness: Despite that many strategies to ensure that tourism benefits the poor have been implemented, the policy is weak in that it does not outline clearly how CBT can be up-scaled so that it attracts many tourists. Because of this, tourism has been considered, by the NCA local community, as unreliable and inadequate to rely on during crisis. Ill-defined policy strategies have seen CBT tourism facing many challenges including limited promotion and advertisement to the source markets; poor quality tourism product; limited segmentation (it fails to capture the diversity of tourists' tastes and preferences); unequal power relationships among Maasai, accommodation & tour guides and the NCAA. Among these Maasai are have the least voices.</p> <p>In addition, the policy is not adequately reflected in the NCA GMP guidelines. For example, it was reported during FGDs that because of lack of clear guidelines in the GMP, CBT has seen a large proportion of revenues going to tour guides/drivers instead of going to the target beneficiaries (the Maasai). The official fee for cultural tourism is US\$ 25 per person or per group. This study noted that, because many tourists are unaware of this fee as it is often not shown in the itinerary, tour guides may charge them more than this. During FGD one participant said:</p> <p><i>'I witnessed a tour guide collecting more than US\$300 from just one group of tourists, but he</i></p>

		<p>only gave us US\$25. Even out of this [official fee] some drivers demand US\$ 5 as a bribe so as to motivate them continues deploying tourists to our boma. We end up collecting only US\$20 from a group/person. If we could have power to communicate directly with tourists before coming, I am sure all these we would benefit more and more'.</p> <p>All these limit local community from gaining more revenues from cultural tourism. As a result tourism becomes an insufficient alternative livelihood strategy for the Maasai to depend during crises. As a result cultural tourism fails to contribute adequately to Maasai's livelihoods. Many participants voiced opinion that if these shortcomings are corrected, tourism can be the biggest employer of local community and they wouldn't demand to engage in other activities like agriculture which is considered incompatible to conservation. Most of the interviewed local people demand for 40% of total NCA's revenues to be directed to their communities; encourage tourists to provide voluntary support to the local people (Swanson, 2007).</p> <p>There are various ways that researcher have proposed to increase tourism benefits. These include: empowering poor people so that they establish primary tourism enterprises; assist them to upgrade their products so as they increase sales of goods and services to visitors; empower the native residents through education so that they acquire necessary skills for employment in tourism enterprises; Enable the local people to supply goods and services to tourism enterprises that are available around their residential areas; and use taxes or levies from tourism income to subsidise native residents' economy. However, a lack of clear strategy to assist local community scale-up cultural tourism leaves local community benefiting less from these opportunities. As a result many community members fail to resist the consequences of droughts because of limited livelihood options.</p>
<p>National environment Policy – 1997 and the Environment management Act</p>	<p>Wildlife resources shall be protected and utilised in a sustainable manner on the basis of careful assessment of natural heritage in natural and fauna, fragile ecosystems, sites under pressure and endangered species with participation of and benefits to the local communities.</p>	<p>Strengths:</p> <p>This policy recognises the importance of practicing environmentally friendly tourism (ecotourism). This is crucial for sustainability of wildlife tourism. The strategies to achieve sustainable tourism are clearly stated in the policy document. Importantly, it recognises the importance of involving local community in conservation and channelling the associated benefits to them. Moreover, the policy limiting tourism development projects (tourists' hotels, rail construction) in wildlife conservation areas and will if need arise the execution of the project will be based on the results of the Environment Impact Assessment study.</p> <p>This policy is well echoed in the NCA GMP as the outcomes of its implementation are</p>

		<p>evident. For example, in 2008, the NCAA conducted an EIA study which prohibited further construction and/or expansions of accommodation facilities in the area (UNESCO, 2010).</p> <p>Furthermore, the policy provides opportunities for the local communities to collect wildlife resources such as firewood that seems to have no ecological impacts when removed. The GMP provides guidelines for this practice. This is important as it widens the resource base available to local community during crisis.</p> <p>Weakness:</p> <p>Unethical leaders may use this policy to impose stringent conditions for local community to utilise natural resources even where it is proven (through EIA) that there will be no negative impacts because the policy does not address the challenges that may arise from power inequalities. Lack of clear strategies to address power relationships may also foster corruption. This may reduce the resource base for local communities to use during crisis, hence increase their vulnerability.</p>
Mineral policy – 1997 and Mining Act	Prohibits any mining activities in protected areas	<p>Strength:</p> <p>It ensures that wildlife resources are protected from negative impacts that may arise from mining. It ensures sustainability of wildlife tourism.</p>
Rural Development Policy and the Rural Development Strategy – 2001	<p>To ensure sustainable and profitable utilisation of the natural resources for the benefits of rural people by involving local communities in management and utilisation of these resources.</p> <p>Enhance environmental management practices that aims to reduce land degradation, water pollution and overexploitation of natural resources</p>	<p>Strengths:</p> <p>Both the Rural development Policy (RDP) and the Rural Development Strategy (RDS) recognise that economic diversification is a key approach for reducing vulnerabilities of the people in rural areas. By so doing, they translate the Tanzania Development Vision 2025 into medium-term implementable program. These put clear strategies for ensuring economic diversification is attained in the rural areas. Importantly, the development tools recognise tourism as the best pro-poor strategy for attaining livelihood diversification. The RDP & RDS are well addressed in the NCA GMP 2006-1016 and good results from their implementations are observable.</p> <p>The RDP and RDS recognise that practices that would lead to over-exploitation of natural resources, land degradation and water pollution are harmful to the sustainable development of rural areas.</p> <p>Weakness:</p>

		<p>Both the RDP and RDS do not outline the factors that would lead to environmental degradation and over-exploitation of natural resources. Climate change is one of the factors that may lead to environmental degradation and over-exploitation of natural resources but it is not addressed in the RDP and RDS. As a result climate change, as a threat to the rural development, is not well addressed in the NCA GMP. This may leave the NCA local individuals less prepared from predicted climate change impacts.</p>
<p>National Bee-Keeping Policy – 1998 and Forest Act</p>	<p>To encourage the establishment of bee-keeping reserves and encourage beekeeping practices that support conservation of ecosystems</p>	<p>Strength: The policy recognises beekeeping as one of the livelihood diversification activities for the people living within or adjacent to wildlife reserved area. The policy acknowledges that beekeeping is an alternative livelihood option that can be used to reduce over-exploitation of wildlife resources by rural people. If well managed, beekeeping can be a source of revenues and contribute to the reduction of vulnerability of NCA local communities especially during crisis.</p> <p>Weakness: The policy does not provide clear information on how beekeeping can be enforced in wildlife reserve areas. As a result it is not well addressed in the NCA GMP. As it is poorly implemented in the area. The policy became operational in Tanzania since 1998 but there has been no beekeeping program in the NCA. As a result many Maasai in the NCA become vulnerable to droughts because of limited economic diversification.</p>
<p>Trade policy - 2003</p>	<p>To improve domestic production (of goods and services) and build a strong diversified and competitive export sector as the means of achieving higher rates of economic growth and development.</p>	<p>Strengths: The policy provides key information for strengthening local people's capacity to improve their livelihoods. The policy: emphasises widening linkages among domestic producers; emphasise increasing access to markets by domestic producers; encourages product diversification; and promotes value adding activities for the existing commodities (promote technological and innovative production systems).</p> <p>The policy raises key requirements for achieving its objectives: it considers the need for raising the private sector's capacity to compete; increasing access to means of production; and ensuring that benefits resulted from the economic growth are accessible to broader segments of the society. Moreover, the policy acknowledges that good governance is a pre-condition for success. All these are strong points for promoting local people's economy and increasing their strengths to resist shocks and/or stressors.</p> <p>Weaknesses:</p>

	<p>Despite that the policy advocates for widening linkages among domestic producers, this study noted that there's poor implementation of these strategies, especially in the study area. The policy is designed for the nation at large without taking consideration that people residing in the NCA face circumstances that are different from other Tanzanians face. The policy does not provide adequate information on how primary producers (in this study - the NCA local community) are linked to secondary producers (such as hotels and manufacturers). For example, during group discussions, discussants lamented that despite that hotels and lodges in the NCA use livestock products (meat and milk) for their visitors the facility operators do not buy these products from the Maasai, rather they import from other places. As a result the NCA local communities (Maasai) fail to utilise this opportunity. According to the hotels/lodge operators, the livestock products offered by the Maasai are of low quality to feed visitors. In addition, visitors come with their own food choices which, in most cases, rely on importation.</p>
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Appendix C-2: Ngorongoro Conservation Area's system management objectives

System component/s subsystem	Management goal	Objectives
Natural resources (wildlife & their habitat)	To ensure that the ecological integrity and biological diversity of the NCA will be managed as the basic components of the multiple land-use system; and ensure that they are essential to the quality of life for residents and are the heritage of the nation and the world.	<ol style="list-style-type: none"> 1. to ensure that management decisions are made based on scientific and indigenous knowledge of the area's natural resources and ecological processes; 2. to ensure the landscape and the associated resources are preserved - for the current and future generations; 3. to ensure that human, livestock and wildlife population have access to quality and adequate water resources; 4. to ensure that viable populations of both common and endangered wildlife resources are maintained; and 5. To increase the number of wildlife in the area.
Tourism	To ensure that tourism is promoted within the context of multiple land-use management.	<ol style="list-style-type: none"> 1. To make sure that the values that have made the NCA to be accorded a world heritage site and a biosphere reserve are realised by the NCA indigenous residents, visitors, the general public and the world at large; 2. to ensure that active participation of NCA indigenous residents in

		<p>tourism activities is realised:</p> <ol style="list-style-type: none"> 3. to make sure that revenues from tourism (within limit of acceptable use) are maximized; and 4. To improve the appreciation of NCA's natural, cultural and historical values to visitors.
Host community	To ensure that the NCA and indigenous residents co-operate to achieve the multiple land-use objectives. The NCA will promote the development of pastoralists' economy and strength social services to enhance human wellbeing.	<ol style="list-style-type: none"> 1. To enhance active participation of NCA indigenous residents in decision making especially in matters related to conservation, development and tourism; 2. To ensure improved income for NCA indigenous residents; 3. To ensure continuous food security among NCA indigenous residents; 4. To ensure quality health services to NCA indigenous residents; 5. To ensure basic services such as education and water supply are provided to NCA indigenous residents; and 6. To reduce incidences of property damage and costs associated with wildlife infringement.
Antiquities and cultural resources	To ensure that the NCA the internationally recognised paleontological and archaeological resources and the strong traditions of the indigenous residents are respected and conserved.	<ol style="list-style-type: none"> 1. To ensure paleontological and archaeological sites that have provided valuable evolutionary information to mankind are adequately preserved for the benefits of current and future generation; and 2. To ensure indigenous residents cultural norms, traditions and values are respected by visitors.

Source: NCA General Management Plan 2006–2016 (URT, 2010).

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