PERCEIVED EFFECTS OF CLIMATE CHANGE ON TOURISM DEVELOPMENT AROUND LAKE NAKURU NATIONAL PARK, KENYA.

BY

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DECLARATION

Declaration by candidate

This thesis is my original work and has not been presented for degree award in any other University. No part of this thesis may be reproduced without the prior written permission of the author and or Moi University. All other sources of information cited herein have been duly acknowledged.

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DEDICATION

I wish to dedicate this thesis to my parents, Mr. and Mrs. Kiboi for their continuous support in my entire education endeavors.

ABSTRACT

Climate change is an environmental challenge facing the world today. This is one of the most serious threats to the society, economy and environment and has lately become an international agenda. Climate change has attracted much attention and participation in the world, especially in Kenya with the emerging effects of climate change on some of the tourism attractions and destinations. Consequently, African countries have begun to realize the constant uncertainties of agricultural exports due to climate change and developmental pressures and have so far shifted their focus to tourism as a new source of economic growth. Tourism plays a major role in boosting the economies of most developing countries in Africa including Kenya. However, climate change is increasingly becoming evident in Kenya, negatively impacting the tourism industry. This is mainly through incidences of rapid changes in rainfall patterns, floods, storms, rising temperatures, human activities and drought. Thus, this affects the tourism industry as well as the communities depending upon it. In this regard, the study investigated perceived effects of climate change on tourism development in Kenya. Further, it identified ways such as promotion of climate friendly and climate proof holiday alternatives so as to adopt tourism development to climate change effects. The study aimed at accomplishing three specific objectives namely; to determine the perceived effects of rapid changes in rainfall patterns on tourism development in Lake Nakuru National Park; To asses the perceived effects of rising temperatures on tourism development in Lake Nakuru National Park and; To analyze if human activities affects tourism development in Lake Nakuru National Park. The study adopted descriptive research design. The local community members living adjacent to LNNP and the employees of LNNP were targeted for data collection. The local community comprised of about 8,000 while the LNNP employees were 200 drawn from various departments. A total of 257 respondents were involved in the study using stratified and simple random sampling techniques. Questionnaires were administered to the local community members living adjacent to LNNP and the employees of LNNP. Secondary sources of data specifically internet, books and journals were used. Primary data that was collected tabulated and analyzed using Statistical Package for Social Sciences (SPSS). Presentation of research outcome was done in form of descriptive statistics such as percentages, frequencies, means and tables while inferential statistics such as chi-square and multiple regression were utilized. The research findings indicated that rapid changes in rainfall patterns, incidences of rising temperatures and human activities negatively affects tourism development as indicated by means of 3.575, 3.605 and 4.22 respectively. In addition, a high ANOVA value of 53.88 was significant. This is also enhanced by the model fit which gives 68.0% implying for every percentage increase in climate change, it explains 68.0% of tourism development in LNNP. The study recommends promotion of a variety of outdoor and indoor tourism products that avoid the vulgarities of weather, use of renewable energy resources, promotion of low-carbon technologies and initiating adoption strategies to curb negative climate change effects on tourism development.

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LIST OF ACRONYMS AND ABBREVIATIONS

AGW	Anthropogenic Global Warming theory
CASSALD	China and South-South Scoping Assessment for Learning and Development
CO_2	Carbon Dioxide
DWC	Dialogue on Water and Climate
FNC	First National Communication
GDP	Gross Domestic Product
GHG	Green House Gas
GNP	Gross National Product
GOK	Government of Kenya
HDR	Human Development Report
HKCCC	Helping Kenya Cope with Climate Change
HLSTN	Hospitality, Leisure, Sport and Tourism Network
IBAs	Important Bird Areas
ICZM	Integrated Coastal Zone Management
IPCC	Inter-Governmental Panel on Climate Change
IRI	International Research Institute for climate prediction
ITCZ	Inter-Tropical Convergence Zone
KACCAL	Kenya Adapting to Climate Change in Arid and Semi-Arid Lands
KMD	Kenya Meteorological Department
KWS	Kenya Wildlife Service
LNNP	Lake Nakuru National Park
MEMR	Ministry of Environment and Mineral Resources

NCCRGP	National Climate Change Response Green Paper
NEMA	National Environment Management Authority
NES	National Environment Secretariat
SIDS	Small Island Developing States
SPSS	Statistical Package for Social Sciences
THC	Thermohaline Circulation
TIES	The International Ecotourism Society
TTF	Tourism Trust Fund
UN	United Nation
UNDP	United Nation Development Programme
UNEP	United Nation Environmental Programme
UNESCO	United Nation Educational, Scientific and Cultural Organisation
UNFCCC	United Nation Framework Convention on Climate Change
UNWTO	United Nation World Tourism Organisation
WMAs	Wildlife Management Areas
WMO	World Meteorological Organisation
WTO	World Tourism Organisation

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DEFINITION OF OPERATIONAL TERMS

Climate change: Refers to a change in the state of the weather that can be identified by changes in the mean and or the variability of its properties that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings or persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2001).

Climate: Refers to the prevailing weather conditions observed as a long term average in a location over many years usually over 30 – 38 years (Becken, 2010).

Development: Refers to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community (UNDP, 2012).

Tourism development: Refers to broadening the ownership base such that more people benefit from the tourism industry through skills development, job creation, wealth creation and ensuring the geographic spread of the industry throughout a particular region or country (UNDP, 2012).

Weather: Refers to atmospheric conditions such as temperature, rainfall, cloudiness, humidity and storm.

CHAPTER ONE

INTRODUCTION

1.0 OVERVIEW

This chapter presents the background information of the study, explains the research problem, states the aim, objectives and research questions, highlights the significance of the study and finally sets the scope of the study and illustrates the conceptual framework.

1.1 Background of the study

Climate has long been considered an unchanging resource for the tourism industry and recreation service providers, but lately the tourism industry and other stakeholders have awoken to possible changes in climate (Scott *et al.*, 2005). Moreover, climate and weather are important factors in tourist's decision making and also influence the successful operation of tourism businesses. Also, tourists and tourism businesses are likely to be affected by weather conditions.

1.1.1 Perceived effects of climate change on tourism

The changes in climate and unpredictable weather may cause serious threats to the supply of recreation opportunities, related businesses and economic activity. In addition, changing climate will cause changes in people's recreation and travel behavior and consequently to the tourism industry serving nature related travelling (Sievänen *et al*., 2005). On the other hand, surface and sea temperatures are generally forecast to increase, rain patterns will change with some areas becoming wetter and others drier, the occurrence of extreme events is also likely to increase (Becken, 2010).

Nevertheless, climate influences the tourism industry by creating foundation of attractiveness, such as snow cover and water level (Scott *et al.*, 2005). Equally important, the length and quality of the season are also dependent on climatic factors with effects on the natural and built environment, therefore changing the attractiveness of the landscape environment that the tourism industry is based on. The impacts and their intensity vary in different regions depending on the type of tourism, the financial dependence on tourism revenues and the manner of climate change in the area (Abegg *et al.*, 1998). Within one area the different kinds of tourism operations are exposed to changes in diverse ways (Smith, 1990).

Abegg (1998) states that weather and climate are factors that set limits and regulate tourism so that their importance as factors defining an area's tourism potential, attractiveness and tourism demand and supply is great. Also, Matzarakis (2001) argues that it is the climatic conditions that have more effect while planning a potential trip but at the destination, the actual weather conditions become much more important, affecting the total image that visitors get from their trip. However, knowledge and expectations concerning the weather in the destination are important factors in tourist's decision making (Bigano *et al.*, 2005).

1.1.2 Perceived effects of climate change on tourism development

Tourism is the fastest growing global industry and has become a major source of employment supporting 74 million and approximately 215 million direct and indirect jobs respectively (UNWTO, 2006). In 2013, international arrivals reached 1087 million, a 5% increase on the 2012 total (UNWTO, 2014). Reflecting this dramatic growth, the tourism industry is important for economic growth and a fundamental vehicle for development (Skinner and Cliftons, 2006). On the contrary, Kenya is

among the countries highly vulnerable to the impacts of climate change, particularly its main economic sectors such as agriculture and tourism. Yet, the tourism industry in Kenya has lately been confronted with various challenges such as insecurity including serious environmental problems emanating from development activities. For instance, Lake Nakuru National park in Kenya, which is world famous for millions of lesser flamingos with a total of 200,000 tourists visiting the park every year (RoK, 2004), is experiencing harmful negative impacts of the ongoing deforestation and human activities that wholly bring about climate change in the park.

Furthermore, the Stockholm Environment Unit (SEI) estimates that the costs of climate change in the country could be equivalent to a loss of almost 3% of GDP by 2030 (Norrington-Davies, 2011).

1.1.3 Tourism as a vehicle for development

Tourism is developing into a powerful, world-wide economic force. International tourism alone generated over US$1.075 billion in 2012 (UNWTO, 2013) whilst, according to the World Travel and Tourism Council (WTTC), if both direct and indirect expenditure is taken into account, then global tourism including domestic tourism is a $7 trillion industry, accounting for over 10% of world gross domestic product (GDP) and around 9% of global employment.

Kenya is the leading country in the horn of Africa from an economic perspective. However, in common with other countries, has found social and economic development to be constrained by amongst other factors, climate variability in particular with regards to episodic events of flooding and droughts.

Tourism has emerged both as an integral element of development policy and as a significant economic sector, tourism represents an effective means of achieving development (Sharpley and Telfer, 2015). Conversely, climate change has been recognized as a further confounding factor requiring attention with regards to the future development of the country but one to which limited consideration has been given (Simpson *et al*., 2012). Keep in mind, there exists overwhelming evidence of climate change in Kenya that negatively impacts the tourism industry and consequently tourism development. One of the apparent signals is the rapid and drastic disappearance of glacier on Mount Kenya, with scientists projecting that the ice cap on the mountain could disappear by the year 2020. Finally, the country's lakes are experiencing serious declines in water levels with drastic changes being observed in volumes of river flows as noted by Rok, (2008).

1.2 Description and location of study area

LNNP is located between longitude 0º 24º S and latitude 36º 05º E. It is located within Nakuru County, about 3km South of Nakuru town, in the Rift Valley Province of Kenya. LNNP is the most important National park in Kenya in terms of earnings from tourism. Furthermore, LNNP is a United Nation Educational, Scientific and Cultural Organisation (UNESCO) designated world heritage site, Kenya's first Ramsar site and also Africa's first bird sanctuary (Odada *et al*., 2005).

1.2.1 Demographic characteristics

From the year 1967 to the present day, human population of the catchment area has been increasing steadily. LNNP currently supports a population of about 8,000 people, 60% of who reside in the rural parts of the catchment and the rest in market centres, small towns and the municipality of Nakuru (KWS, 1994). Demographic

characteristics of the catchment area from 1989-1999 shows that population density increased by over 60%. High population including human activities have negatively affected LNNP through, high pollutants, industrial and other commercial activities (Sengupta and Delwani, 2008). Annual population growth rate of Nakuru district is estimated to be 4.85%.

1.2.2 Tourism Activities

The most exciting concentrations of wildlife in Kenya are found in LNNP. The park occupies an estimated area of 188 km² endowed with diverse habitats, each with its characteristic fauna and flora. Eleven major ecological habitats are represented (Odada *et al.,* 2004). These range from the lakes, mud flats, salt marshes, wooded grassland, dense forest, bush and cliff habitat. LNNP wildlife is comprised of 70 mammal species, 400 bird species and over 200 plant species making the park ideal for a safari. However, LNNP is as a result of chronological events. In the 1950s, the lake was one of the best sites for observing flamingos and also an ideal site for sport shooting of migratory birds. Consequently, this raised concern with nature lovers who were concerned with the fate of the flamingos and lobbied the government for protection of the lake. Eventually, the birds were protected under the royal game ordinance. In 1990, LNNP was designated as a Ramsar site (site No. 476), in other words a wetland of international importance (Odada *et al*., 2005). Over the years, LNNP has become an island of nature surrounded by a sea of humanity.

1.2.3 Economic Activities

LNNP is a highly valued National park and a major generator of revenue for the local and National economy. Nakuru town economically contributes to the National economy through agriculture, livestock, forestry, tourism, fisheries, mining, industry,

commerce, research and conservation activities. LNNP is the second most frequently visited park in the country, earning the government substantial revenue at a relatively low management cost. It is a popular destination for local and international tourists and receives approximately 200,000 visitors annually crossing over US$ 4.5 million annually from gate collections alone (RoK, 2004). Furthermore, it is Africa's first bird sanctuary and a United Nation Educational, Scientific and Cultural Organization (UNESCO) designated world heritage site. In addition to generating revenue for the government, the park has also contributes to the socio-economic development of Nakuru town and its environs through tourism development, hotel accommodation, food, curio sales and other entrepreneur activities.

1.2.4 Climate

LNNP climate ranges from cold, hot and humid to arid and semi-arid. The mean annual rainfall averages 750mm annually, falling within the periods of November to December and April to May. However, total annual rainfall increases and becomes more certain and dependable with increasing altitude. In addition, climate ranges from cold and humid to arid and semi-arid, typical characteristics of the Rift Valley floor. There is a general decrease in rainfall from the crest of the catchment towards Lake Nakuru, which is located in a rain shadow. Conversely, rainfall mainly occurs in the afternoons with heavy storms that may last between 10 minutes to one hour and they are quite erosive. In addition, the erosive of the storms ranges between 6,000 and 10,000 Joules/sq./yr. This energy range is among the highest in Kenya resulting to gully erosion in north-western part of the catchment. Areas undergoing serious erosion include the newly opened forest zones. Total soil loss from the whole catchment is more than 80,000 tons per year or about 17 tons per hectare per annum (Simpson *et al*., 2012).

1.2.5 Vegetation

Forested areas of the catchment basin consist of the Eastern Mau, the Eburru and the Dondori forests. Eburru forest is mainly composed of indigenous trees covering an estimated area of 8,736 hectares while Dondori forest covers an estimated area of 6,956 hectares. The Eastern Mau forest forms part the Mau complex and is the largest of these forest blocks covering an estimated area of 65,000 hectares. It is mainly composed of indigenous forests that over the last 10 years have been progressively encroached to pave way for human settlement. Subsequently, between 1967 and 1986, more than 400 km² of forest and land under natural vegetation in the catchment basin were cleared for settlement. During this period, the area of the catchment under forest and natural vegetative cover declined from 47% to 26%. Little baseline data exists for biodiversity in the forested areas. However, felling of vast tracts of natural and plantation forest have resulted to eliminated wildlife habitat hence their reducing numbers. The extent of the Eastern Mau forest was reduced by 28% between 1967 and 1987 in order to make way for human settlement. A recent survey in these forest blocks revealed that large scale cultivation is occurring within the Eburru forest where an estimated 400 acres has been illegally occupied and converted to potato farms. Consequently, charcoal burning, illegal logging and cultivation are rampant in both Eburru and Dondori forests. Human wildlife conflict between LNNP administration and its immediate neighbors have continued with wild animals damaging crops and property in adjacent farms while the inhabitants of the basin have continued with environmental degradation (KWS, 2002).

1.3 Statement of the problem

Climate is one of the main drivers of International tourism, as majority of tourists seek to relax in the sun or the snow (Aguiló *et al*., 2005). However, projected rise in

temperatures, rapid changes in rainfall patterns and human activities (burning of fossil fuels, deforestation, pollution, intensive logging and farming) increase concentration of greenhouse gas (GHG) resulting in climate change that negatively affects tourism activities.

Recently, there has been rise in frequency of intense drought, fires, floods, storms, heat stress and ecological damage. This has adversely affected tourism development in various ways including damage on tourism facilities and infrastructure. For instance, lately heavy rains pounding Lake Nakuru National Park resulted to a halt of tourism activities and operations. Consequently, flooding destroyed vegetation around the Lake causing destruction of vegetation and risk of starvation of animals that depend on it leading to their death or migration to other regions. On the other hand, El Niño rains in 1997/1998 affected almost 1 million people and caused damage to roads, buildings, communications and loss of crops (ECCK, 2009). Furthermore, Kenya has over the past 20 years lost more than 5,700 hacters of forests per year to forest fires (Kunzler, 2011). While in neighboring Tanzania, it is projected that by 2020 the famous snows of Mt. Kilimanjaro will have totally disappeared implying climate change is taking place. In addition, there has already been a spectacular decrease in the number of lions, elephants and rhinoceroses in Africa (UNWTO, 2007). Further, the National Tourism Industry Strategy paper asserts that Kenya has developed an over reliance on wildlife as an attraction. Elsewhere, because of massive destruction in the Mau forest, over logging, clearing of forests for agriculture and settlement, Lake Nakuru may be extinct in another eight years unless the current destruction is not contained.

In addition, Kenya's infrastructure continues to be built based on the assumption that climate will remain unchanged in future. Such an assumption is misguided, considering that climate change is already threatening vital infrastructure such as road and rail networks as well as water and energy systems that tourism fundamentally depends on for development (Rok, 2010).

Nevertheless, few studies have specifically analysed the potential impacts of climate change on tourism development and more specifically on the numbers of tourists visiting a specific country (Hein *et al*., 2009). Also, little information is available on threats against biodiversity in Kenya (Kiringe and Okello, 2007). Therefore, this study attempts to examine the negative effects of climate change on tourism development in Kenya.

1.4 Research objectives

1.4.1 General objective

The main objective of this study was to investigate the perceived effects of climate change on tourism development in Lake Nakuru National Park.

1.4.2 Specific objectives

i. To determine the perceived effects of rapid changes in rainfall patterns on tourism development in Lake Nakuru National Park.
ii. To assess the percieved effects rising temperatures on tourism development in Lake Nakuru National Park.
iii. To analyze if human activities affects tourism development in Lake Nakuru National Park.

1.4.3 Research hypothesis

HO_1: There is no significant effect of rapid changes in rainfall patterns on tourism development in Lake Nakuru National Park.

HO_2: There is no significant effect of rising temperatures on tourism development in Lake Nakuru National Park.

HO_3: There is no significant effect of human activities on tourism development in Lake Nakuru National Park.

1.5 Justification and significance of the study

The study will be beneficial in raising awareness and preparedness among tourism stakeholders to face extreme climatic events and disasters through provision of information and understanding perceived effects of climate change on tourism development.

Similarly, the study findings will benefit key tourism stakeholders including investors, the government, tourism businesses, local community, tour operators and travel agents in mitigating perceived effects of climate change. For instance, the study findings will help the government in enacting laws and policies that will be essential in mitigating climate change effects. Also, tourism businesses will have to understand the negative effects of climate change, for instance findings from previous studies indicate that tourists are already demanding climate friendly and climate proof holiday alternatives that avoid the vulgarities of weather, in addition, as Bigano *et al*.,(2007) argues that climate change would move tourists towards higher latitudes and altitude meaning that colder countries will experience an increase in domestic tourism while warmer countries a reduction implying that tourism expenditures will be halved in warmer countries and doubled in colder countries, hence tourism

businesses will have to inculcate this changes and trend on their operations and product making.

Kenya is now seeking a fast track towards the creation of a middle income country with a high standard of living through the implementation of Vision 2030, a comprehensive development program for the country. Although it is an ambitious program, it has been recognized that a major factor constraining development in East Africa could not have been considered in the preparation of vision 2030, namely climate variability and change that directly restrain many social and economic activities including tourism in Kenya (Simpson *et al*., 2012). In addition, tourism development will be affected by climate change through extreme events such as droughts or floods that consequently would change the perception of Kenya as a destination through ecological damage and loss of species or biodiversity (Clare *et al*., 2008).

Most important, the research aimed to address the effects of climate change on tourism development in Kenya that calls for stabilization of the Greenhouse gases (GHGs) emissions in the atmosphere at a level that would prevent 'dangerous anthropogenic interference' with the climate system within a time frame sufficient to allow ecosystems and the environment as a whole to adopt naturally to climate change so as to enable economic development (HDR, 2007). This is because of the fact that, Africa's environment and socio-economic systems are highly vulnerable to the impacts of climate extremes such as droughts and floods (AMCEN/UNEP, 2002). Thus, severe weather and extreme climate events and other climatic fluctuations have been shown to have a high influence on the social and economic activities of the

country including tourism and the performance of the country's economy (KNBS, 2008).

1.6 Scope of the study

The study was conducted in Lake Nakuru National Park (LNNP) since previous studies (Kiringe and Okello, 2007) raise concerns that major Rift valley lakes are experiencing serious water level declines coupled with human encroachment. The main research instruments that was used was structured (closed ended) questionnaires that obtained information from the staff and local residents of Lake Nakuru National Park. The study period covered four months.

The study target population were the local communities living adjacent to Lake Nakuru National Park and the employees of Lake Nakuru National Park. In addition, the study endeavored to investigate the perceived effects of climate change on tourism development with a spotlight on the ongoing effects of climate change in Lake Nakuru National Park (LNNP).

1.7 Theoretical framework

This study adopted sociological paradigm shift theory because it touches on both aspects of climate change and tourism development. Sociologists found the concept of paradigm shift useful since Thomas Kuhn's publication of 'The Structure of Scientific Revolutions' in 1962. His observation was that paradigms do not in fact shift until their adherents are replaced with a new generation. Linking this concept to climate change, everything changes, and there is no generation to wait for adherents of the old paradigm to die off. Rather, experts warn that climate breakdown has begun, and therefore a need to act swiftly and that serious consequences will be far worse than if action is not taken now (McDonald, 2007).

Further, the above theory is supported by Roman Catholic philosopher and environmentalist Thomas Berry. He argues that the deepest cause of the present devastation is found in a mode of consciousness that has established a radical discontinuity between the human and other modes of being and the bestowal of all rights on the humans. He further argues for recognition of rights for trees, insects and mountains, pointing out quite reasonably that when the American Constitution was written (and it was the prototype democratic constitution), such matters were not under discussion. He however called for law schools to promote this rethinking, calling for an expanded jurisprudence, requiring humans to respect others' rights, that the order of the universe as a whole must be the criterion, not the rights of one part of it (McDonald, 2007).

1.8 Conceptual Framework

The framework discusses the relationship between climate change and tourism development. Climate change has developed as the largest of the unintended consequences of this era of industrial revolution. On the contrary, back in the nineteenth century, construction of railways and factories went on with no idea that rising global temperatures, storms, deforestation, polar ice melting and rising oceans could be the negative result of the industrial revolution.

Climate change may result either from natural factors such as changes in the sun's intensity or slow changes in the earth's solar orbit, or from human activities that change the composition of the atmosphere like burning of fossil fuels, and the land surface such as deforestation and urbanization (GTZ and ESD, 2007). As temperatures increase, the oceans will expand which in combination with glacial

melting will lead to rising sea levels. Global average sea levels have risen since 1961 at an average rate of 1.8 mm/yr and since 1993 at 3.1 mm/yr (IPCC, 2007).

Thus the negative effects associated with climate change that is of a particular concern of the present study include, intensive rainfall, flooding, fires and rising temperatures. The latter result in drought, desertification, low water volumes in lakes in the event of drought, forest receding, loss of biodiversity and ecological damage. Most important, rising temperatures cause heat stress for tourists, ecological damage, loss of biodiversity including cooling costs, changes in plant and wildlife populations that negatively affects tourism development. Furthermore, rapid changes in rainfall patterns cause extreme events such as floods, forest fires that damage tourism infrastructure.

On the other hand, tourism development is also negatively affected through, low arrivals as a result of unfavorable climate conditions for example intensive rainfall, high insurance costs to insure tourism businesses from the vulgarities of climate change, need to install cooling and air conditioning machines hence rising operational costs, need of tourism businesses to shift and use non-renewable sources of energy such as solar hence additional costs, damage on tourism infrastructure caused by floods and intensive rainfall, reduced attractiveness of tourism destinations as a result from desertification or drought hence dissatisfied visitors and rise in human wildlife conflict as a result of drought. All this negative effects imply retarded tourism development. This is described in figure 2.0.

CONCEPTUAL FRAMEWORK

INDEPENDENT VARIABLE **DEPENDENT VARIABLE**

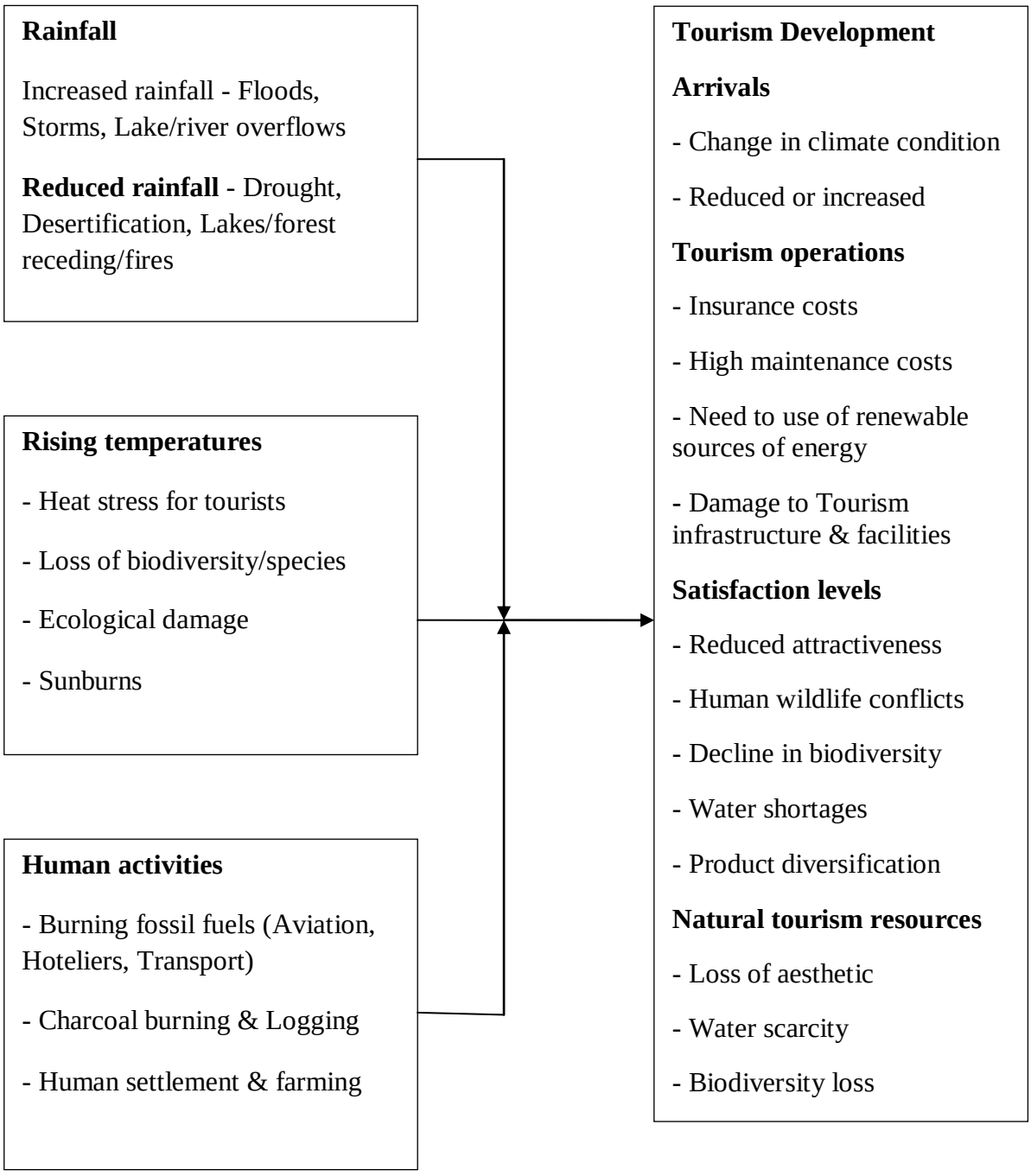

Figure 2.0 Conceptual framework

Source: Author (2013)

1.9 Assumptions and Limitations

According to Mugenda and Mugenda (2003), an assumption is any fact that a researcher takes to be true without actually verifying it. It also means a statement related to the study that is taken as true in the absence of facts, often to accommodate a limitation. Whereas a limitation refers to inability of the study team to fully meet the study objectives or fully investigate the study issues.

The study was only conducted in one location that is Lake Nakuru National Park, which was a particular area hence the results may not be the same if the research was to be done in other parts of the country.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter begins with a review of the literature that describes the concept of climate change and tourism development based on the objectives of the study, followed by a discussion about Kenya's climate change and how it affects tourist's arrivals, tourism operations and natural tourism resources (water, energy, landscape and biodiversity). Further, it examines possible ways tourism attractions, destinations and operations can adopt to climate change effects. Finally, a conceptual framework related to climate change effects on tourism development is presented.

2.1 Tourism development and climate change

The development agendas of many developing countries are increasingly being affected by climate related disasters including drought, floods and landslides (DWC, 2003). This is largely because of the increasing climate variability and the risks associated with it. While Kenya's contribution to greenhouse gases (GHGs) is minimal in comparison to developed countries, it is adversely affected by the effects of climate change (Rok, 2012). In addition, climate change will affect all aspects of the economy including tourism and leisure industries. Also, tourism and leisure are both potentially climate sensitive sectors and are likely to be affected by climate changes in the future (HLSTN, 2008). Furthermore, The National Climate Change Response Green Paper (NCCRGP, 2010) identified tourism as one of many sectors and areas vulnerable to climate change. Most important, the impact of climate change on infrastructure and the natural environment has the potential to affect the tourism industry in some cases which could result in social and economic impacts in areas that highly depend on tourism as a source of income and employment.

Kenya is home to five hot spots of globally important biodiversity and 61 important bird areas (IBAs). These unique and biodiversity rich regions include the Indian Ocean Islands of Lamu and Kisite Mpunguti, the coastal forests of Arabuko-Sokoke and the lower Tana River, the Afro-montane forests of Mount Kenya, Aberdare and Mount Elgon, Kakamega's Guineo-Congolian equatorial forest, the Northern dry lands that form part of the distinct horn of Africa biodiversity region. This ecosystem collectively contain high levels of species diversity and genetic pool variability with some species being endemic or rare, critically endangered, threatened or vulnerable due to climate change (NEMA, 2009).

Moreover, complicated interactions exist between tourism development and climate change. This complicated interactions range from natural effects, external effects to those resulting from human behaviors. Direct climate change effects from weather phenomena include, warming and destruction by wrought floods, storms, fires, drought, glacial lake overflows, and the disappearance of beaches. Indirect impacts include, long-term impacts resulting from a substantial and lasting alteration of the environment of a tourist destination that reduces its attractiveness (polluted waters, receding forests, decreased biodiversity, retreating glaciers and snow caps), lifestyle changes including the reorientation of tourism flows both in winter and summer. Induced impacts, which include the efforts of individuals and public policies aimed at attenuating the effects of warming that produce a series of consequences for tourism activity (Xola Consulting Inc., 2009).

In addition, among the many impacts climate change can have on the economy, the impacts on tourism activities hence tourism development is one of the most important. This is because climate conditions are obviously crucial in determining tourism

destination choices, so any change in climate conditions will have consequences in terms of number of incoming or outgoing tourists, tourism revenues, consumption patterns, income and welfare (Roson and Sartori, 2012).

Also, climate change affects tourism development by affecting the natural resources on which tourism is based (Scott *et al.*, 2007). Any change in the characteristics of the climate in Kenya could reduce the tourism flow negatively by altering the perceived attractiveness of the Kenyan environment. Unlike tourism based on built attractions such as theme parks, shopping malls and cultural attractions such as historical museums, archaeological remains, historical monuments, folklore and traditional festive celebrations, wildlife based tourism that Kenya is heavily dependent on, is very sensitive to climatic variability and change (Smith, 1993). Thus, climatic conditions, such as temperature, precipitation and humidity are important for tourism (Gomez and Martin, 2005).

2.2 History of climate change and tourism

Research on climate related tourism issues began in the 1960s but it was not until the 1980s that researchers began to show interest in climate change and its impacts on tourism. Since then, climate change has had moderate visibility in tourism research but only lately, during the present century, has the issue provoked more interest among policymakers and institutions such as the World Tourism Organization (WTO) and the United Nations (UN). In addition, despite Africa's fast growing human population and the associated impacts on natural resources, it is one of the least studied continents in terms of ecosystem dynamics and climate variability (Hély *et al.*, 2006).

2.2.1 Kenya's climate change

African countries are likely among the most vulnerable to the impacts of climate change because of their geographic location and inadequate capacity to adopt to climate change (IPCC, 2001). Kenya comprises of a tropical climate. It is hot and humid at the coast, temperate inland and very dry in the northern parts of the country. In addition, there is plenty of sunshine all the year round. However, it is usually cool at night and early in the morning. Long rains pound from April to June while short rains are experienced from October to December.

Moreover, Kenya's geographic location makes it inherently prone to cyclical droughts and floods. However, according to the First National Communication (FNC, 2002), such types of cyclical climate driven events will increase in intensity and frequency due to global climate change. Finally, serious repercussions are anticipated thereby not only on agricultural productivity but also the achievement of poverty reduction and other millennium development goals.

2.2.2 Rapid changes in rainfall patterns and tourist arrivals

Kenya has a wide spectrum of water resource base, which consists of both surface and groundwater resources (fossil and rechargeable). Similarly, terrestrial surface water resources systems are strongly influenced by rainfall. Most projections of future climate change in Kenya indicate that rainfall will either increase or remain unchanged in the humid areas, but will decrease in the arid and semi-arid areas, this is clearly evident in figure 2.1 indicating global sea level on the rise. This implies that terrestrial surface water resources are very vulnerable to the impacts of climate change (KACCAL, 2012). On the other hand, climate changes are already affecting many tourism destinations and altering the decisions of travelers (UNWTO, 2007).

Weather conditions experienced by tourists at the destination are important for many reasons. First, weather allows an activity to be undertaken. In other words, weather influences how enjoyable an experience would be for visitors. Therefore, tourist's satisfaction is likely to be at least partly weather dependent. Finally, tourist's safety can depend on the weather for example in relation to heat waves, extreme wind events or floods (Becken, 2010).

Additionally, hot weather conditions increase the risk of forest fires. For instance, Greece experienced devastating fires in the summer of 2000 where more than half of all tourist bookings for 2001 were cancelled. Similarly, drought in the State of Colorado (USA) in 2002 created dangerous wildfire conditions and visitor numbers declined by 40% in some areas. This was largely as a result of media coverage and perceived risks by tourists (Scott and Lemieux, 2009). Most important, climate variability and changing weather patterns can also affect the planning of tourism programs and daily operations. For example, changing weather patterns at tourist destinations and tourism generating countries can largely affect tourist's comfort, decisions for trips and the ultimate flow of tourists (arrivals). Low arrivals in Spain, Italy and other destinations that currently attract the traditional 'sun and sand' tourist segment is expected to decrease as the current 'summer peak' season gradually becomes too hot for comfort (Amelung *et al.*, 2007).

Equally important, climate change shifts international tourism flows towards higher altitudes and latitudes (Hamilton *et al.*, 2005). In addition, redistribution of tourism flows could negatively affect countries and regions that depend heavily on income from tourism. On the other hand, it could also bring benefits to places that are currently not popular with tourists (Bigano *et al.*, 2007) mainly because the influence

of climate change on tourism demand patterns will be shaped by the response of tourists to the complexity of mitigation policy and its impacts on transportation systems, the wide range of climate change impacts on destinations, as well as broader impacts on society and economic development (Gossling *et al*., 2012).

Elsewhere, a recent study projection on changing environmental conditions under high warming scenarios for the year 2080 in Canada's Rocky mountain National Parks revealed that recreationists will be less inclined to visit the park as a result of changing ecosystems. A related study which focused on changing temperatures found that visitor numbers would actually increase (Becken, 2010). The combination of both studies highlights the need to consider both direct climate effects for example temperature and indirect changes when seeking to anticipate future use patterns (Scott *et al*., 2008).

Special attention goes to the reason that tourist destinations are likely to gain competitiveness while others will become less attractive or will have to shift their seasons. For example, suggested for the Mediterranean which might change from its current pattern of a summer peak season into a bimodal spring-autumn pattern (Amelung and Viner, 2006).

Finally but not least, colder countries will experience an increase in domestic tourism as warmer countries experience a reduction. Therefore, climate change may double tourist expenditures in colder countries and halve them in warmer countries (Bigano *et al*., 2007). Therefore, understanding perceptions and reactions to the impacts of climate change is essential to anticipating the potential geographic and seasonal shifts in tourism demand. In addition, changes in specific tourism markets and the overall competitiveness of businesses and destinations (Gossling *et al*., 2012).

2.2.3 Rapid changes in rainfall patterns and visitor satisfaction levels

Tourism is among Kenya's top two foreign exchange earners after Agriculture. The UK (United Kingdom) is one of the principal source markets for Kenya's tourism. Visitors are attracted to the 25 National parks and 23 game reserves. The number of visitors to the National parks and game reserves in the year 1993 was 1.4 million and half of the earnings from the tourism industry can be attributed directly and indirectly to wildlife. In addition, eight out of ten visitors, come to Kenya for the wildlife (Viner and Agnew, 1999). However, climate change may increase the frequency of flooding, drought and land degradation resulting in reduced viability of recreation activities and wildlife safaris.

Moreover, infrastructure that is crucial for tourism development may also be affected by climate change. For instance, heavy rainstorms can cause temporary closure of tracks and make the lake shore inaccessible (Viner and Agnew, 1999). Similarly, research at the Great Barrier Reef in Australia indicated that poor weather has a more pronounced effect on satisfaction than good weather because of sea sickness, cold or wet conditions, reduced visibility and difficult snorkelling conditions all led to reduced satisfaction levels (Coghlan and Prideaux, 2009). On the other hand, there is considerable evidence demonstrating the intrinsic importance of weather and climate for tourist decision making including motivations, destination choice and timing of travel, as well as experience (Scott and Lemieux, 2010).

Even though climate is not the only factor that tourists weigh, it is one of the most important considerations for a range of activities designed to satisfy tourists. Most important, tourists love good weather and there are few other economic activities that are as dependent on climate as tourism. Equally important, majority of tourism

activities take place outdoors, so having a clean environment and favorable weather conditions are key to visitor satisfaction and fundamental to the continued success of any tourism destination (UNWTO, 2007). This means that climate and local natural conditions are significant factors in the choice of many holiday destinations. It is expected that climate change will not affect the amount of travel taken in the future but it is expected to affect the choice of destinations and where expenditures will occur. In addition, natural environments such as snow and glacier capped mountains, coastal and island environments, beaches, forests, rivers, lakes, deserts and many other beautiful landscapes are already experiencing the impact of climatic changes in varying degrees (Xola Consulting Inc., 2009).

2.2.4 Rising temperatures and tourism operations

Weather and climate are factors that set limits and regulate tourism activities. This means that weather and climate defines an area's tourism potential, attractiveness, tourism demand and supply (Abegg, 1996). Also, climate and weather are significant elements for the tourists because climatic conditions have more importance while planning a potential trip. However, at the destination the actual weather conditions become much more important affecting the total image that visitors get from their trip (Matzarakis, 2001).

Climatic characteristics include temperature, precipitation, clouds, fog, wind and humidity. This characteristics affects tourism operations in various ways for example, frequent events of rising temperatures lead to sun burns to visitors. In addition, tourism businesses are also faced with the need to install cooling and fresh air machines in the event of rising hot temperatures. Thus, the need to use renewable sources of energy such as solar, implying additional operational costs. Moreover,

comfortable and barrier free climatic conditions attract tourists (Beniston, 2003). Changes in these factors can have a direct impact on the quality of visitor trips. Also, climate change can also alter the environment of the tourist's origins and change the demand (Richardson and Loomis, 2004).

Knowledge and expectations concerning weather in the destination area are important factors in tourist's decision making (Bigano *et al*., 2005). Considering this, it is legitimate to presume that changes in climatic conditions can have major impact on tourism operations in future. Furthermore, warming temperatures are projected to cause more frequent and more intense extreme weather events such as heavy rain storms, flooding, fires, hurricanes, tropical storms and El Niño events (IPCC, 2001). According to the IPCC, it is very likely that hot extremes, heat waves and heavy precipitation events will continue to become more frequent. Moreover, extension of the regions that will be primary affected by these extreme events with major tourism destinations highlights the need for awareness and preparedness for natural hazards at the local level through systematic capacity building and strategies for disaster risk management.

Despite an increased scientific understanding of the magnitude and regional variation in climate change in the coming decades, the societal costs of climate change remain difficult to quantify. This is mainly due to uncertainty surrounding future climate change and economic projections as well as the complexities linking physical impacts to economic processes (Hein *et al.,* 2009). Similarly, one of the sectors for which it has been particularly difficult to assess the impacts of climate change is the tourism industry. It is nevertheless likely that tourism will be strongly affected by climate

change, as many tourist activities are dependent on weather conditions (Hein *et al.*, 2009).

Potential tourists change their preferences much more rapidly and are already demanding more climate friendly and climate proof holiday alternatives. On the other hand, tour operators need to begin developing low carbon tourism products while destinations need to further diversify their tourism offer with a variety of indoor and outdoor activities that avoid the valgaries of weather (UNWTO, 2007).

Finally, rising temperatures pose various challenges to tourism operations including increasing the need for cooling (cost for air conditioning) and major damage to transportation systems (Mills and Andrey, 2002). Thus, operational and maintenance costs are expected to increase substantially under different global warming scenarios, these need to be factored in as part of today's decision making, investment and adaptive measures such as heat proof building designs will be beneficial (Becken, 2010).

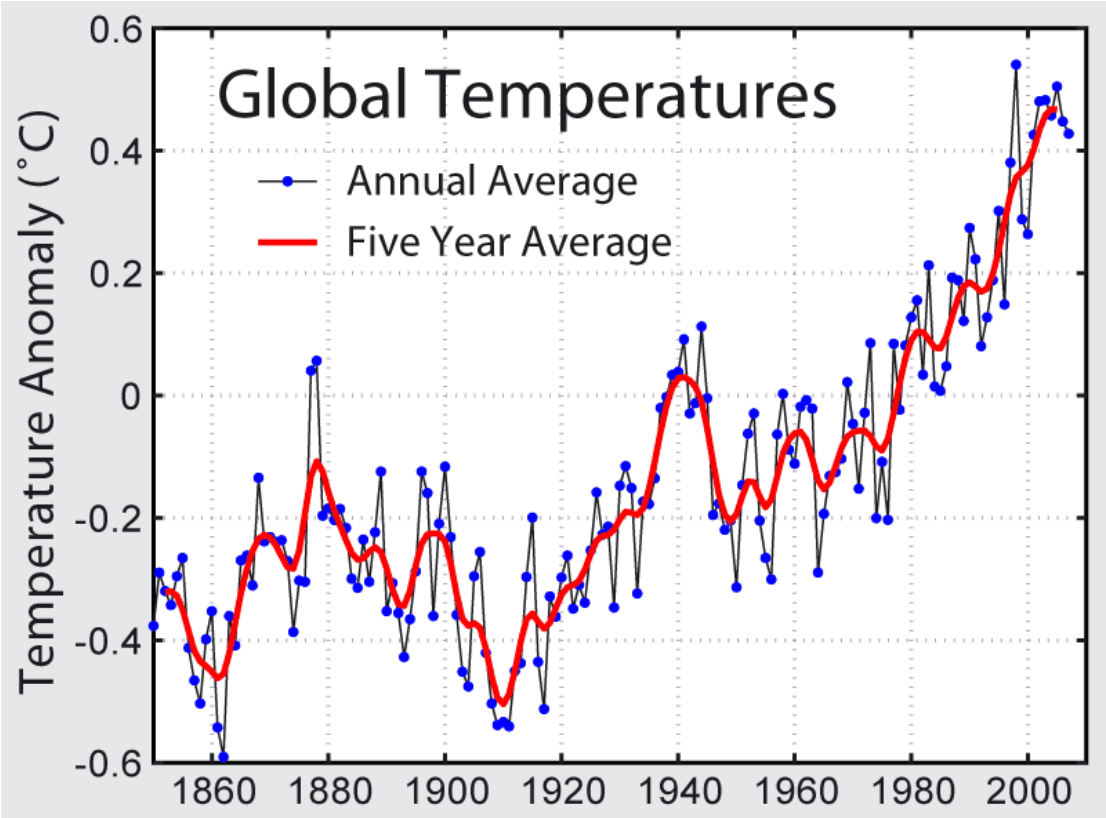

Figure2.1: Global tempartures on the rise

Source: Kenvironews.files.wordpress.com

2.2.5 Human activities and natural tourism resources

The impacts of climate change on tourism are likely to manifest themselves in a number of different ways according to local conditions. Many of these impacts will develop indirectly through increased stress placed on environmental systems (Viner and Agnew, 1999). In sub-Saharan Africa, which includes parts of East Africa, several ecosystems, particularly grass and shrub savannahs are highly sensitive to short term availability of water due to climate variability (Vanacker *et al.*, 2005). Ecosystems will be and are indeed already being affected by climate change with resulting impacts on ecotourism destinations through biodiversity loss (HLSTN, 2006).

Furthermore, there is growing concern about climate change impacts on tourism resources as more evidence signals that changes in climate due to human activities may have a significant impact on natural resources globally (Alley *et al*., 2007; Becken and Hay, 2007). Climate change is already having an impact on the dynamics of African biomes and its rich biodiversity, although species composition and diversity is expected to change due to individual species response to climate change conditions (Erasmus *et al*., 2002). For instance, wildlife tourism in Africa is based on the current network of parks and reserves.

Current climatic conditions and distributions of species result in changing ecological conditions such as precipitation, evaporation and flowering time, hence potential threat to wildlife populations or induce a shift in distributions and migration patterns (Becken, 2010). In addition, land use patterns in Africa can also prevent wildlife from changing their migratory routes, for example, park boundary fences have been demonstrated to disrupt migratory journeys, leading to population decline in wildebeest (Whyte and Joubert, 1988). Also, parks that are closely connected to seasonality including the Serengeti with the 'great migration' of wild beast are particularly vulnerable (Agnew & Viner, 1999).

According to the Intergovernmental Panel on Climate Change (IPCC), almost all scientists concur that human activities for instance burning of fossil fuels increase CO_2 emission to the atmosphere hence playing a serious role in causing and accelerating climate change as shown in figure 2.1. In addition, effects of climate change include a rise in the average global temperatures, an increase in extreme weather events (for example more frequent floods, droughts, heat waves, more storms

and intensive rain) as well as a change in regional and seasonal precipitation patterns (rainfall).

Flooding can damage tourism infrastructure and pose a great risk for the safety of both tourists and host communities. Such climate related hazards can greatly hamper economies of local businesses. Furthermore, climate change can also alter the natural environment that represents both a key attraction and a basic resource for tourism, for example through coastal erosion, damage to coral reefs and other sensitive biodiversity rich ecosystems. On the other hand, drought and other extreme climatic events such as cyclones and hurricanes are common effects of climate change. Consequently, drought can have serious negative impacts on resources upon which tourism is depended on such as death of wildlife due to inadequate water hence retarded tourism development. Climate change is further expected to significantly alter the African biodiversity as species struggle to adapt to changing conditions (Lovett *et al.*, 2005). Elsewhere, Fiji tourism faces major issues resulting from climate change such as shoreline and beach erosions, temporarily reduced water availability, coral bleaching and physical damage to property (UNWTO, 2004).

Kenya is a mega biodiversity state with its biodiversity hoisted in its various habitats and ecosystems, the latter include forests, grasslands, wetlands, coral reefs and mangroves among others. Most of Kenya's biodiversity are also found within protected areas comprised of habitats and ecosystems (Rok, 2007). Yet, Kenya is a country that is particularly at the risk of the impacts of climate change because of its geography, reliance on rain fed agriculture, pastoral livestock production systems and tourism which is heavily dependent on nature (HKCCC, 2012). The country is prone to cyclical droughts with major ones occurring every ten years and minor ones every

three to four years (UNEP and RoK, 2000, Downing *et al*., 1989). It is expected that intensity and frequency of droughts will increase. Incidences of drought in Kenya are anticipated to increase both in intensity and frequency as a result of climate change (FNC, 2002). In addition, over seventy percent of the natural disasters in Kenya are related to extreme weather and climate events such as strong winds, droughts and floods amongst others. Consequently, extreme weather and climate events influence the entire economy of the country with droughts and floods having the highest adverse effects on the economy including the tourism industry (KACCAL, 2012).

Tourism in Kenya is entirely dependent upon the unique natural attractions countrywide. However, these attractions are highly vulnerable to change in climatic conditions. The gradual yet dramatic disappearance of tropical mountain glaciers on Mount Kilimanjaro has been attributed partly to global warming (IPCC, 2001). Moreso, expansion in air travel is itself increasing emissions of greenhouse gases and enhancing the risks of continued global warming (IPCC, 1999).

Furthermore, projected rapid rise in temperatures combined with destruction of habitats from land use could result in disruption in the connectedness among species hence leading to extinction of numerous floral and faunal species. In addition, plant species may not be able to respond to climate change resulting to increased vulnerability of ecosystems to natural and anthropogenic disturbance hence species diversity reductions (Malcolm *et al*., 2002).

Lastly, climate change has the potential to alter migratory routes and timings of species that use both seasonal wetlands (for example migratory birds) and track seasonal changes in vegetation (for example herbivores) which may also increase

conflicts with humans particularly in areas where rainfall is low (Thirgood *et al.*, 2004). This was very relevant to the ongoing perceived effects of climate in Lake Nakuru National Park.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter discusses the research methodology used in an attempt to achieve the objectives of the study. It aims at highlighting sampling procedures, methods of data collection, methods of data analysis, presentation and interpretation. However, the study area is first described.

3.1 Study area

This research study uses the case study of LNNP. The flamingos together with hippos, reedbuck, black rhino, giraffe, lion, leopard, bushbuck and 400 species of birds resulted in creation of LNNP in 1961 with an area of 164 km². A Map showing the study area is indicated in appendix V.

3.2 Research design

This study adopted descriptive research design. Descriptive research attempts to describe, explain and interpret conditions of the present. The purpose of a descriptive research is to examine a phenomenon that is occurring at a specific place(s) and time in this case perceived effects of climate change on tourism development.

Descriptive research is concerned with conditions, practices, structures, differences or relationships that exist, opinions held and processes that are going on or trends that are evident. (Kombo and Tromp, 2006).

3.3 Data collection

Data was collected from various sources. It comprised of both secondary data and primary data. Secondary data was gathered from published and unpublished sources such as books, journals and internet while primary data was obtained using semi-structured questionnaires and collected through questionnaires.

3.3.1 Primary data

Questionnaires were used as a tool for soliciting information as the respondents fill it at their own convenient time. Specifically, the study used semi-structured questionnaires that were administered by the help of one research assistant and covered items on the perceived effects of climate change on tourism development. The questionnaires were administered to the local community members living adjacent to LNNP and the employees of LNNP. All the respondents were administered with the same set of questions in the questionnaires that had four sections. Section (a) had questions on general information, Section (b) on the perceived effects of climate change on tourist arrivals, Section (c) on perceived effects of climate change on tourism operations and Section (d) on perceived effects of climate change on natural tourism resources (water, energy, landscape and biodiversity).

3.3.2 Secondary data

Secondary data was collected from published and unpublished sources related to the present study. This included textbooks, publications, tourism development plans, dissertations and other works including magazines and journals written by different scholars. This data was obtained from Moi University's Margaret Thatcher library,

University of Eldoret Library, and the Kenya National Library Services, Eldoret branch. Only relevant information was extracted and fully acknowledged.

3.4 Target population

A population (also called a universe) is a group of measurements (notorganisms) about which one wishes to draw conclusions (Zar, 1999). The target population for the study were 8,000 respondents from local community members living adjacent to LNNP (KNBS, 2008) and 200 LNNP staff. The targeted local community members were spread out in seven villages; Langalanga, Manyani, Kanyon, Kisulisuli, Kampi Somali, Kaptembwa and Zakayos while the LNNP employees were 200 drawn from ten different Departments in which ten respondents were selected from each Department (stratum).

3.5 Sampling techniques

Sampling technique refers to a description of strategies used to select representative elements, subjects, respondents from the target and accessible population (Oso and Onen, 2005). Stratified and simple random samplings were used in this study. Simple random sampling was used to identify respondents from the target population specifically local community members living adjacent to LNNP. Stratified sampling was used to identify respondents to administer questionnaires mainly the employees of LNNP. The employees were from various Departments: security, park management, tourism, community, education, procurement, accounts, research, customer care and human capital. Further, the Departments formed various subgroups (stratum) that enabled selection of an appropriate number of subjects. Ten employees were selected from each department.

Simple random sampling technique allowed for equal chances of selecting the desired representation, which was achieved from a population of heterogeneous samples. Stratified sampling was used in order to achieve desired representation from various subgroups in the population. The obvious advantage in stratified random sampling is that it ensures inclusion, in the sample, of subgroup, which otherwise would be omitted entirely by other sampling methods because of their small numbers in the population (Mugenda and Mugenda, 2003).

3.6 Sample Size

The following formula of Krejcie (1970) used in social science research, was used to determine the sample size.

$n = (X^2Npq) / [d^2 (N-1) + X^2pq]$

Where:

n = the desired sample size

N = the target population

p = the population proportion (take 0.5)

q = 1-p the population proportion (take 0.5)

d = the statistical significance level (0.05)

X^2 = Chi-square value of (3.841)

Mugenda and Mugenda (2003) asserts that if no estimate is available of the proportion in the target population, as is this case study, 50% should be used. In this case, the sample size was;

$n = [3.841 \times 8000 \times 0.5 \times 0.5] / [0.05^2 \times (8000-1) + 3.841 \times 0.5 \times 0.5]$

n = 367 respondents

3.7 Data Analysis and Presentation

Both qualitative and quantitative data analysis procedures were used in data analysis. The completed questionnaires were evaluated for errors before they were subjected to analysis. After the data entry, data was examined to facilitate answering the objectives of the study. Analysis of data was then processed statistically using Statistical Package for Social Sciences (SPSS). Quantitative and qualitative methods of data analysis employing inferential and descriptive statistics respectively were used to analyze the results to assess the varied responses. Data was presented in a synthesized form using graphical techniques such as tables, figures, bar graphs and pie charts.

3.7.1 Quantitative Data Analysis

Quantitative data analysis procedures was used to analyze the data collected through questionnaires. Statistical Package for Social Sciences (SPSS) software was used for both descriptive analysis and inferential analysis. This type of data analysis was intended to separate any significant differences that might be evident between the demographic characteristics of respondents and their level of agreement or disagreement with perceived climate change effects on tourism development.

3.7.2 Descriptive Statistics

Quantitative data was analyzed using descriptive statistics and described what was going on in the data and mainly took the form of percentages, frequencies, means and tables. Furthermore, analysis involved the use of the chi-square test to test the relationship between climate change and tourism development. Data is also presented using tables, pie charts and graphs.

3.7.3 Inferential Statistics

Many times researchers wish to make inferences about a population based on data obtained from a sample. To do this, researchers use inferential statistics. Inferential statistics are certain types of procedures that allow researchers to make inferences about a population based on findings from a sample.

Inferential statistics is used to make inferences from data to more general conditions. The interpretation of the results is based on the probability of p. If the probability of p is small, then the result is unlikely to be due to chance, that is, the result in the sample is likely to exist in the population.

Data collected in this study, was measured on interval and ratio scale. Thus, chi-square tests on contingency tables and multiple regression were utilised, in which one of the variables was considered to be functionally dependent upon at least one of the others. In this relationship, Y and X represent the dependent and independent variables respectively. These are tourism development and climate change effects, respectively as indicated below.

$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \ldots.. + bnxn$

Where y - tourism development,

A - Intercept,

B_1x_1 - climate change effects,

bnxn - Error

3.8 Validity and Reliability

For research findings to be accepted and test the objectives of the study, the research tools must be reliable and valid. This means that data collection techniques must adequately address all aspects under study as well as providing an opportunity of

assessing the validity of information gathered. On one hand, reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials, on the other hand, validity of a test is a measure of how well a test measures what it is supposed to measure (Mugenda and Mugenda, 2003).

3.8.1 Validity of the instrument

Face validity was done to ensure that the instrument gathers the information the study purports to collect. Face validity pertains to whether the test "looks valid" to the examinees who take it, the administrative personnel who decide on its use and other technically untrained observers. Thus, the researcher relied on the expert advice of the supervisors and other members of the Department of Tourism Management, Moi University on the validity of the instruments.

3.8.2 Reliability of the instrument

Reliability was done by finding the Cronbach alpha of all valid questionnaires. If the Cronbach alpha is more than 0.70 (Nunnall, 1978), they were admitted as reliable. The Cronbach's Alpha of the variables tested on the study was more than 7.0. This shows that the questionnaires used in the study had high validity, accuracy, stability and consistency.

3.9 Ethical considerations

The researcher treated information collected with confidentiality and used it for the purpose of the research only. In addition, the researcher adhered to individual privacy, hence the respondents were assured of their individual privacy. Voluntary participation and other requisite human rights and principles were also adhered to during the research. Lastly but not least, the researcher provided all participants in the

study with clear information on the nature and the purpose of the research study before embarking on data collection. Finally, the researcher obtained research permit and clearance from Kenya Wildlife Service before data collection.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Overview

The purpose of this chapter is to present findings of data collected based on the questionnaires administered. Demographic profiles in terms of age, gender, marital status, education level and occupation have been presented. The results of descriptive analysis are also presented.

4.1 Response rate

A total of 257 questionnaires were received from the respondents out of the total number of 367 questionnaires circulated. This formed 70% response rate from the respondents involved in the study.

4.2 Demographic characteristics

The study highlighted the profile of the respondents according to various demographic characteristics including age, gender, marital status and level of education which played an important role in ascertaining perceived climate change effects among the various demographic characteristics.

4.2.1 Age of staff and local community respondents at LNNP

Age is an important factor which affects respondent's ability to answer questions. It was established from the findings that majority 90.0% of the respondents were in the age bracket of 21 - 40 years and 10.0% between age bracket of 41- 60 years as shown in table 4.1.

Table 4.1: Age of respondents

Age	Frequency	Percent
21 - 40 years	231	90
41 - 60 years	26	10
Total	257	100

Source: Field data (2013)

4.2.2 Gender of respondents

The researcher sought to determine gender representation of the respondents. It was established from the study that 55.0% of the respondents were male and 45.0% were female as shown in table 4.2.

Table 4.2: Gender of respondents

Gender	Frequency	Percent
Male	141	55.0
Female	116	45.0
Total	257	100.0

Source: (Field data, 2013)

4.2.3 Marital Status of the Respondents

Marital status in any field is of great importance when providing services to customers. It was established that 35% (n = 90) of the respondents were married, 50% (n = 128) were single and 15% (n = 39) were divorced as shown in figure 4.3. Thus, majority of respondents were single.

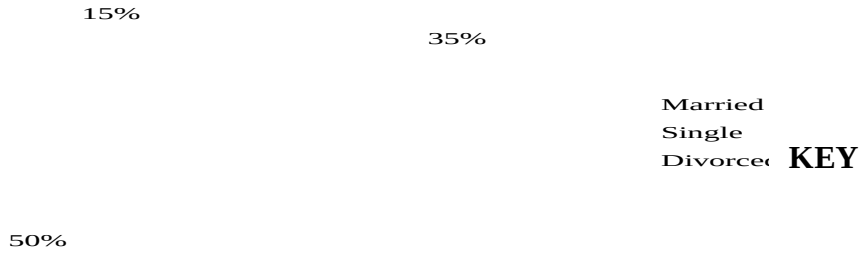

Figure 4.2: Marital status of the respondents

Source: (Field data, 2013)

4.2.4 Education Level of Respondents

Academic qualification is important in order to determine the levels of understanding by employees of the various functions of LNNP. The results of the responses were; 10% (n = 26) of the respondents had secondary, 25% (n = 64) college and 65% (n = 167) university levels of education as shown in figure 4.4.

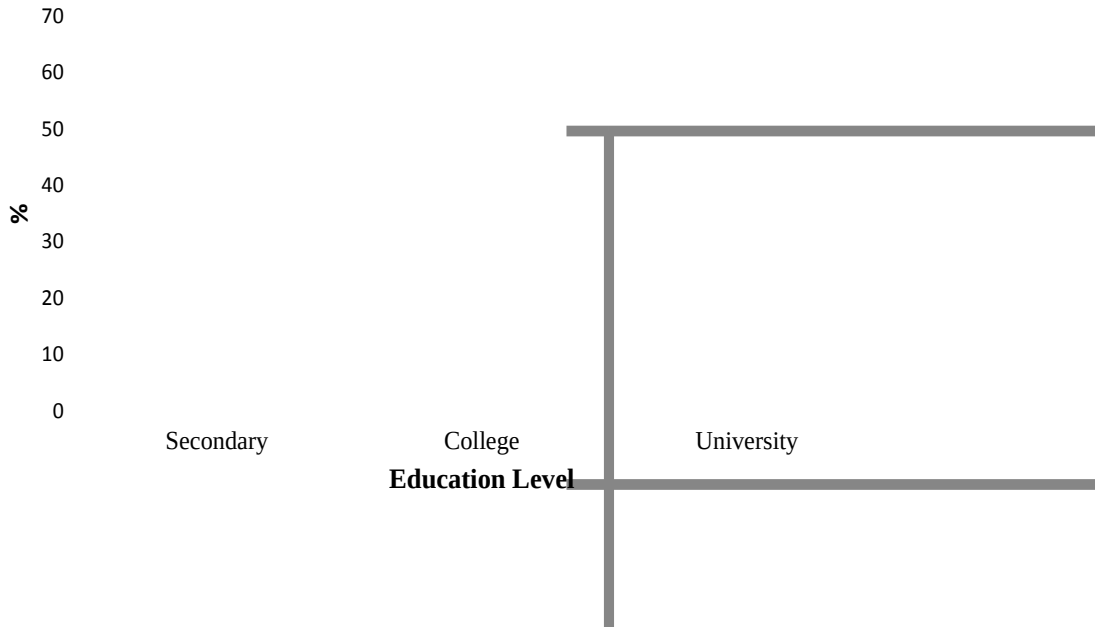

Figure 4.3: Education level of respondents

Source: Field data (2013)

4.3 Perceived effects of rapid changes of rainfall patterns on tourism development

The following variables were tested under perceived effects of rapid changes of rainfall patterns on tourism development: periodic floods and drought, intensity of extreme wind, frequency of intensive rainfall, intensity of extreme storm, changes in consumer trends, reduced attractiveness of tourism attractions, rise in food costs, rise in repairs costs for tourism businesses, rise in insurance and rescue costs for tourism operations, changes in visitors tastes and preferences, reduced service quality, difficulty in accessing attraction sites by visitors, changes in quality of tourism products, reduced tourism earnings, reduced tourism revenue, reduced seasonality, unfavourable climatic conditions, degradation of tourism facilities and infrastructure, changes in wildlife migration patterns, decline in biodiversity, cancellation of flights due to bad weather, roads and bridges closed as a result of bad weather, disruption of water operations due to rising water levels, cancellation of tourism activities such as safari, evacuation of tourists in the advent of floods, water shortage, increased human wildlife conflict, increased poaching, frequent forest fires, interrupted supply chain of food and decline of landscape aesthetic as shown in appendix II.

Furthermore, data was transformed and treated as categorical data hence measurement was done at nominal level. Thus, chi-square was used in order to examine and establish the degree of relationship between the dependent and independent variables. The dependent variable was “tourism development” while the independent variable was “climate change”. The correlation coefficient was significant on all the independent variables of rainfall at $p < 0.05$ which indicates that the variables had a positive effect on tourism development. All the variables were significant except, frequency of intensive rainfall as a result of rapid changes in rainfall patterns (χ^2 =

2.8; df = 2; p = 0.247) and (χ^2 = 6.40; df = 2; p = 0.041) for increased poaching due to rapid changes in rainfall patterns as shown in appendix III.

4.3.1 Increased frequency of extreme events and changes in consumer trends

Majority of the respondents 40% (n = 103) strongly agreed that frequency of intensive rainfall affects tourist arrivals 35% (n = 90) agreed with the statement, only 25% (n = 64) were neutral as indicated in appendix II. This confirms that intensive rainfall affects tourist arrivals.

On the statement that extreme storm affects tourist arrivals, a total of 45% (n = 116) of the respondents agreed while 25% (n = 64) strongly agreed, 14% (n = 36) disagreed, 10% (n = 26) were neutral. Only 6% (n = 15) of the respondents strongly disagreed. This confirms that extreme storms affect tourist arrivals.

Also, on the statement that changes in consumer trends was attributed to rapid changes in rainfall patterns, 40% (n = 103) and 40% (n = 103) of the respondents agreed and strongly disagreed respectively. While 5% (n = 13) strongly disagreed, 5% (n = 13) were neutral and 10% (n = 25) disagreed with the statement.

This is supported by chi-square values: (χ^2 = 40; df = 4; p = 0.000) for increased intensity of extreme storm due to rapid changes in rainfall patterns and (χ^2 = 54; df = 4; p = 0.000) for changes in consumer trends due to rapid changes in rainfall patterns as indicated in appendix III.

4.3.2 Rising costs, reduced attractiveness of destinations and changes in visitor's tastes and preferences

Most respondents 55% (n = 141) agreed, 25% (n = 64) strongly agreed, 15% (n = 39) were neutral while 5% (n = 13) strongly disagreed that rise in food, repairs, insurance

and rescue costs was attributed to rapid changes in rainfall patterns as indicated in appendix II. This indicates that majority of the respondents agreed that rise in food, repairs, insurance and rescue costs was as a result of rapid changes in rainfall patterns.

Majority of the respondents 45% (n = 116) strongly agreed, 37% (n = 95) agreed, 80% (n = 20) strongly disagreed 50% (n = 13) were neutral and 50% (n = 13) disagreed that reduced attractiveness of tourism destinations was as a result of rapid changes in rainfall patterns. This is an indication that rapid changes in rainfall patterns especially reduced rainfall and reduce attractiveness imply negative image of tourism destinations.

Almost half of the respondents 45% (n = 116) strongly agreed, 30% (n = 77) agreed, 20% (n = 51) were neutral and 5% (n = 13) strongly disagreed with the statement that changes in visitors tastes and preferences was as a result of rapid changes in rainfall patterns. This implies that majority of the respondents strongly agreed that rapid changes in rainfall patterns change visitors tastes and preferences.

This is supported by chi-square values: (χ^2 = 44.8; df = 3; p = 0.000) for rise in food, repairs, insurance and rescue costs due to rapid changes in rainfall patterns, (χ^2 = 68; df = 4; p = 0.000) for reduced attractiveness of tourism destinations as a result of rapid changes in rainfall patterns, and (χ^2 = 27.2; df = 3; p = 0.000) for changes in visitors tastes and preferences due to rapid changes in rainfall patterns, as indicated in appendix III.

4.3.3 Reduced service quality, changes in quality of tourism products and reduced tourism revenue

Most 55% (n = 141) of the respondents agreed, 30% (n = 77) strongly agreed, 90% (n = 23) were neutral and 60% (n = 16) strongly disagreed with statement that reduced service quality was attributed to rapid changes in rainfall patterns as indicated in appendix II.

Majority of the respondents 55% (n = 142) agreed, while 25% (n = 63) strongly agreed and 20% (n = 52) were neutral that changes in quality of tourism products was attributed to rapid changes in rainfall patterns. This implies that majority of the respondents agreed that rapid changes in rainfall patterns change the quality of tourism products for instance a safari would be difficult to undertake in the event of heavy rainfall.

Majority, 38% (n = 98) of the respondents agreed, 35% (n = 90) strongly agreed, 15% (n = 39) were neutral and 12% (n = 30) strongly disagreed that reduced tourism earnings was attributed to rapid changes in rainfall patterns. This show that majority of respondents agreed that rapid changes in rainfall patterns reduce tourism earnings.

The sum total of those who agreed 45% (n = 116) and 35% (n = 30) strongly agreed, implying that reduced tourism revenue was attributed to rapid changes in rainfall patterns, 10% (n = 26) were neutral, 8% (n = 20) strongly disagreed and 2% (n = 5) disagreed.

This is supported by chi-square values: (χ^2 = 49.6; df = 3; p = 0.000) for reduced service quality due to rapid changes in rainfall patterns, (χ^2 = 17.2; df = 2; p = 0.000) for changes on quality of tourism products as a result from rapid changes in rainfall

patterns, (χ^2 = 32; df = 3; p = 0.000) for reduced tourism earnings due to rapid changes in rainfall patterns, and (χ^2 = 56; df = 4; p = 0.000) for reduced tourism revenue as a result of rapid changes in rainfall patterns, as shown in appendix III.

4.3.4 Difficulty in accessing attraction sites, seasonality and unfavourable climatic conditions

A total of 45% (n = 116) agreed, while 45% (n = 116) strongly agreed, 50% (n = 13) were neutral and 50% (n = 13) strongly disagreed that difficulty in accessing attraction sites by visitors could be attributed to rapid changes in rainfall patterns as indicated in appendix II. This implies that majority of the respondents strongly agreed that difficulty in accessing attraction sites by visitors was as a result from rapid changes in rainfall patterns.

Most of the respondents, 65% (n = 167) agreed, 25% (n = 64) strongly agreed, while 50% (n = 13) were neutral and 50% (n = 13) strongly disagreed that reduced seasonality could be attributed to rapid changes in rainfall patterns.

On unfavorable climatic conditions, 45% (n = 116) agreed, 35% (n = 90) strongly agreed, 10% (n = 25) strongly disagreed, 50% (n = 13) disagreed and 50% (n = 13) were neutral that rapid changes in rainfall patterns result in unfavorable climatic conditions to undertake tourism activities.

This is supported by chi-square values: (χ^2 = 51.2; df = 3; p = 0.000) for difficulty in accessing attraction sites by visitors as a result from rapid changes in rainfall patterns, (χ^2 = 76.8; df = 3; p = 0.000) for reduced seasonality due to rapid changes in rainfall patterns, and (χ^2 = 56; df = 4; p = 0.000) for unfavourable climatic conditions as a result from rapid changes in rainfall patterns, as shown in appendix III.

4.3.5 Degradation of tourism infrastructure, wildlife migration and decline in biodiversity

Most respondents, 60% (n = 154) agreed, 35% (n = 90) strongly agreed and 50% (n = 13) strongly disagreed that degradation of tourism facilities and infrastructure could be attributed to rapid changes in rainfall patterns as indicated in appendix II. This implies that majority of the respondents supported that rapid changes in rainfall patterns result in degradation of tourism facilities and infrastructure.

On whether rapid changes in rainfall patterns result in wildlife migration patterns, 50% (n = 129) agreed, 40% (n = 103) strongly agreed, 60% (n = 15) strongly disagreed, 40% (n = 10) were neutral. This implies that majority of the respondents supported that rapid changes in rainfall patterns result in wildlife migration.

A total of 35% (n = 90) agreed, 35% (n = 90) strongly agreed, while 25% (n = 64) were neutral and 50% (n = 13) strongly disagreed that rapid changes in rainfall patterns result in decline in biodiversity.

This is supported by chi-square values: (χ^2 = 36.4; df = 2; p = 0.000) for degradation of tourism facilities and infrastructure as a result from rapid changes in rainfall patterns, (χ^2 = 52.8; df = 3; p = 0.000) for changes in wildlife migration patterns due to rapid changes in rainfall patterns, and (χ^2 = 52.8; df = 3; p = 0.000) for decline in biodiversity as a result from rapid changes in rainfall patterns, as shown in appendix II.

4.3.6 Flight cancellations, closure of transportation routes and disruption of wateroperations

A total of 35% (n = 90) respondents agreed, 35% (n = 90) strongly agreed, 25% (n = 64) were neutral and 5% (n = 13) disagreed that cancellation of flights due to bad

weather could be attributed to rapid changes in rainfall patterns as shown in appendix II.

Also, 50% (n = 128) strongly agreed, while 35% (n = 90) agreed, 5% (n = 13) were neutral, 5% (n = 13) disagreed and 5% (n = 13) strongly disagreed that rapid changes in rainfall patterns result in closure of roads and bridges.

Majority of respondents, 60% (n = 154) agreed, 20% (n = 51) strongly agreed, while 10% (n = 26) disagreed and 10% (n = 26) were neutral that rapid changes in rainfall patterns resulted in disruption of water operations. This shows that rapid changes in rainfall patterns result in disruption of water operations such as swimming.

This is supported by chi-square values: (χ^2 = 19.2; df = 3; p = 0.000) for cancellation of flights due to bad weather, and (χ^2 = 72; df = 4; p = 0.000) for closure of roads, trucks and bridges as a result from rapid changes in rainfall patterns, as indicated in appendix III.

4.3.7 Disruption of tourism activities and water shortages

On the statement that rapid changes in rainfall patterns result in cancellation of tourism activities such as a safari, 55% (n = 141) agreed, while 25% (n = 64) strongly agreed and 20% (n = 52) were neutral with the statement as indicated in appendix II. This indicates that rapid changes in rainfall patterns result in cancellation of tourism activities such as a safari.

In addition, 50% (n = 128) of the respondents agreed, 35% (n = 90) strongly agreed, 10% (n = 26) disagreed while 50% (n = 13) were neutral that rapid changes in rainfall patterns result in evacuation of tourists in the advent of floods.

On the statement that water shortage resulted from rapid changes in rainfall patterns, 40% (n = 103) of the respondents agreed, 30% (n = 77) strongly agreed, 15% (n = 39) disagreed while 15% (n = 39) were neutral to the statement that rapid changes in rainfall patterns result in water shortage. This indicates that majority of respondents agreed with the statement.

This is supported by chi-square values: (χ^2 = 17.2; df = 2; p = 0.000) for cancellation of tourism activities for example a safari as a result from rapid changes in rainfall patterns, (χ^2 = 43.2; df = 3; p = 0.000) for evacuation of tourists in the advent of floods due to rapid changes in rainfall patterns and (χ^2 = 41.4; df = 3; p = 0.002) for water shortage as a result from rapid changes in rainfall patterns, as shown in appendix III.

4.3.8 Increased human wildlife conflict, poaching and decline in landscape aesthetic

A total of, 45% (n = 116) respondents agreed, 40% (n = 102) strongly agreed, 10% (n = 26) were neutral and 5% (n = 13) strongly disagreed that rapid changes in rainfall patterns result in increased human wildlife conflict as indicated in appendix II. This implies that rapid changes in rainfall patterns increase human wildlife conflict.

Out of the 257 respondents in total, 40% (n = 103) agreed, 40% (n = 103) were neutral and 20% (n = 51) strongly disagreed with the statement that rapid changes in rainfall patterns increase poaching.

A total of 40% (n = 103) respondents strongly agreed, 35% (n = 90) agreed, 20% (n = 51) were neutral and 5% (n = 13) disagreed that decline of landscape aesthetic result in rapid changes in rainfall patterns.

This is supported by chi-square values: (χ^2 = 40; df = 3; p = 0.000) for increased human wildlife conflict as a result from rapid changes in rainfall patterns, (χ^2 = 6.4; df = 2; p = 0.041) for increased poaching as a result from rapid changes in rainfall patterns, and (χ^2 = 24; df = 3; p = 0.000) for decline in landscape aesthetic due to rapid changes in rainfall patterns, as shown in appendix III.

4.3.9 Frequent forest fires and interrupted supply chain of food

On the statement that frequent forest fires resulted from reduced rainfall, 40% (n = 103) of the respondents agreed, 30% (n = 77) were neutral, 25% (n = 64) strongly agreed while 50% (n = 13) disagreed on the statement that frequent forest fires resulted from reduced rainfall as indicated in appendix II.

Also, most respondents, 65% (n = 167) agreed that interrupted supply chain of food resulted from reduced rainfall, 20% (n = 151) strongly agreed with the statement, 10% (n = 26) only were neutral and 50 % (n = 13) disagreed. This indicates that majority of the respondents agreed that reduced rainfall result in interrupted supply chain of food.

This is supported by chi-square values: (χ^2 = 20.8; df = 3; p = 0.000) for frequent forest fires as a result from rapid changes in rainfall patterns, (χ^2 = 72; df = 3; p = 0.000) for interrupted supply chain of food due to rapid changes in rainfall patterns, as shown in appendix III.

4.4 Relationship between rising temperatures and tourism development

A total of 50% (n = 128) respondents agreed, 35% (n = 90) were neutral and 15% (n = 39) strongly agreed that rising temperatures would affect tourism operations as shown in table 4.3. Although this may imply this finding was not significant (χ^2 = 0.8; df = 1; p = 0.371) as indicated in table 4.4. Most respondents, 35% (n = 90) strongly agreed

that extreme sunshine would affect tourism operations, 30% (n = 77) were neutral with the statement, 25% (n = 64) agreed, only 10 % (n = 26) disagreed. This show that majority of the respondents strongly agreed that extreme sunshine would affect tourism operations. Although this may imply this finding was not significant (χ^2 = 11.2; df = 3; p = 0.11). On the statement that poor air quality would affect tourism operations, 60.0% (n = 154) of the respondents agreed, 25% (n = 64) strongly agreed, 10% (n = 26) were neutral while 50% (n = 13) disagreed on the statement that poor air quality would affect tourism operations. This indicates that majority of respondents agreed with the statement.

Table 4.3: Effects of rising temperatures on Tourism Development in LNNP

Rising temperatures would affect tourism operations in LNNP through	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
	%	%	%	%	%	
More frequent heat waves	0	0	35	50	15	100
Extreme sunshine	0	10	30	25	35	100
Poor air quality	0	5	10	60	25	100

Source: Field data (2013)

The correlation coefficient was significant on all the independent variables of rising temperature at $p < 0.05$ which indicates that the variables had a positive effect on tourism development, except high operation and maintenance costs as a result from rising temperatures (χ^2 = 0.8; df = 1; p = 0.371) and extreme sunshine (χ^2 = 11.2; df = 3; p = 0.11) due to rising temperatures. The chi-square values ranged from (χ^2 = 59.2; df = 3; p = 0.0) to (χ^2 = 0.8; df = 1; p = 0.371) as shown in table 4.4.

Table 4.4: Relationship between rising temperatures and tourism development

Rising temperatures would affect tourism operations in LNNP through	Chi-Square	df	Asymp. Sig.
High operation and maintenance costs	.800[a]	1	.371
Hot temperatures	20.800[b]	3	.000
More frequent heat waves	14.800[c]	2	.001
Extreme sunshine	11.200[b]	3	.011
Poor air quality	59.200[b]	3	.000
Increased ultraviolet radiation	57.600[b]	3	.000

Source: Field data (2013)

4.5 Relationship between human activities and tourism development

4.5.1 Reduced attractiveness of tourism destinations and need to reduce tourism related greenhouse gas emissions

Most respondents 65% (n = 167) agreed, 20% (n = 51) were neutral and 15% (n = 39) strongly agreed that reduced attractiveness of tourism destinations would occur as a result of human activities as shown in table 4.5. This implies that reduced attractiveness of tourism destinations would occur as a result of human activities.

On the statement that there is need to reduce tourist greenhouse gases, majority of the respondents 70% (n = 180) agreed, 20% (n = 51) strongly agreed and 10% (n = 26) were neutral with the statement. This indicates that there is need to reduce tourist greenhouse gases that would affect natural tourism resources.

This is supported by chi-square values: (χ^2 = 36.4; df = 2; p = 0.000) for reduced attractiveness of tourism destinations as a result from human activities, and (χ^2 = 49.6;

df = 2; p = 0.000) for need to reduce tourist green house gases due to human activities as indicated in table 4.6.

4.5.2 Poor health of key wildlife species and ecological destruction

Most respondents 65% (n = 167) agreed, 25% (n = 64) strongly agreed while 10% (n = 26) were neutral to the statement that poor health of key wildlife would occur as a result of human activities as shown in table 4.5. This implies that majority of the respondents supported that poor health of key wildlife would occur as a result of human activities.

On the statement that ecological destruction would affect natural tourism resources, 55% (n = 141) of the respondents agreed, 30% (n = 77) strongly agreed, 10% (n = 26) were neutral and 5% (n = 13) strongly disagreed with the statement. This implies that most respondents agreed that ecological destruction would affect natural tourism resources.

This is supported by chi-square values: (χ^2 = 38.8; df = 2; p = 0.000) for poor health of key wildlife as a result from human activities, and (χ^2 = 49.6; df = 3; p = 0.000) for ecological destruction due to human activities, as indicated in table 4.6.

4.5.3 Desertification, increase of endangered species and fragile habitat for wildlife

A total of 45% (n = 116) respondents strongly agreed that desertification would affect natural tourism resources, 30% (n = 77) agreed with the statement, while 25% (n = 64) were neutral as shown in table 4.5. This show that majority of respondents strongly agreed that desertification would affect natural tourism resources.

On the statement that human activities would lead to increase of endangered species, 45% (n = 115) of the respondents strongly agreed, 35% (n = 90) agreed, 10% (n = 26) were neutral while 10% (n = 26) strongly disagreed to the statement that human activities would lead to increase of endangered species. This indicates that majority of respondents strongly agreed with the statement.

Majority of the respondents 52% (n = 133) agreed, 40% (n = 103) strongly agreed and 8% (n = 21) were neutral that human activities would lead to fragile habitat for wildlife. This implies that majority of respondents supported that human activities would result to fragile habitat for wildlife.

This is supported by chi-square values: (χ^2 = 49.6; df = 2; p = 0.074) for desertification as a result from human activities, (χ^2 = 30.4; df = 3; p = 0.000) for increase of endangered species due to human activities, and (χ^2 = 52.8; df = 3; p = 0.000) for fragile habitat for wildlife as a result from human activities, as indicated in table 4.6.

4.5.4 Visual pollution, biodiversity loss and use of non-renewable sources of energy

Most respondents, 60% (n = 154) agreed that human activities would result in visual pollution, 30% (n = 77) strongly agreed with the statement, 10% (n = 26) were neutral as shown in table 4.5. This show that majority of respondents strongly agreed that human activities would result in visual pollution.

On the statement that human activities would result in biodiversity loss, 45% (n = 116) of the respondents agreed, 35% (n = 90) strongly agreed, 15% (n = 38) were

neutral and 50% (n = 13) strongly disagreed with the statement. This implies that most respondents agreed that human activities would result in biodiversity loss.

Also, a total of 40% (n = 103) respondents strongly agreed that use of non-renewable sources of energy would affect natural tourism resources, 40% (n = 103) agreed with the statement, while 20% (n = 51) were neutral. This show that majority of the respondents strongly agreed that use of non-renewable sources of energy would affect natural tourism resources. The summary is shown in table 4.7.

This is supported by chi-square values: (χ^2 = 59.2; df = 3; p = 0.000) for visual pollution as a result from human activities, (χ^2 = 32; df = 3; p = 0.000) for biodiversity loss due to human activities, and (χ^2 = 6.4; df = 2; p = 0.041) for use of non-renewable sources of energy as a result from human activities, as indicated in table 4.6.

Table 4.5: Effects of human actitivities on natural tourism resources in LNNP

Human activities would affect natural tourism resources in LNNP through	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Total
	%	%	%	%	%	%
Reduced attractiveness of tourism destinations	0	0	20	65	15	100
Rise in need to reduce tourism greenhouse gases	0	0	10	70	20	100
Poor health of key wildlife	0	0	10	65	25	100
Ecological destruction	5	0	10	55	30	100
Desertification	0	0	25	30	45	100
Increase of endangered species	10	0	10	35	45	100
Fragile habitat for wildlife	0	0	8	52	40	100
Visual pollution	0	0	10	60	30	100
Biodiversity loss	5	0	15	45	35	100
Use of non-renewable sources of energy	0	0	20	40	40	100

Source: Field data (2013)

The correlation coefficient was significant on all the independent variables of human activities at $p < 0.05$ which indicates that the variables had a positive effect on tourism development, except ($\chi^2 = 49.6$; df = 2; $p = 0.074$) for desertification due to human activities and ($\chi^2 = 6.4$; df = 2; $p = 0.041$) for use of non-renewable sources of energy due to human activities. The chi - square values ranged from ($\chi^2 = 59.2$; df = 3; $p = 0.000$) to ($\chi^2 = 6.4$; df = 2; $p = 0.041$) as shown in table 4.6.

Table 4.6: Relationship between human activities and tourism development

Human activities would affect natural tourism resources in LNNP through	Chi-Square	Df	Asymp. Sig.
Reduced investments in tourism development	43.200[a]	3	.000
Reduced tourism products & activities	26.800[b]	2	.000
Reduced attractiveness of attractions	48.000[c]	4	.000
Reduced attractiveness of tourism destination	36.400[b]	2	.000
High demand for air conditioning	19.600[b]	2	.000
Increased currency leakage	28.800[a]	3	.000
Need to reduce tourist greenhouse gases	49.600[b]	2	.000
Poor health of key wildlife	38.800[b]	2	.000
Ecological destruction	49.600[a]	3	.000
Desertification	49.600[a]	2	.074
Increase of endangered species	30.400[a]	3	.000
Fragile habitat for wildlife	52.800[a]	3	.000
Visual pollution	59.200[a]	3	.000
Biodiversity loss	32.000[a]	3	.000
Use of non-renewable sources of energy	6.400[b]	2	.041

Source: Field data (2013)

4.6 Multiple regression analysis

Factor analysis was applied with the aim of data reduction and therefore simplification of a large number of intercorrelated measures of variables to a few representative constructs or factors, the results can be seen in appendix IV. Varimax rotation was undertaken, where Varimax attempts to minimize the number of variables that have high loadings on a factor. This enhances the interpretability of the factors where determination of the number of factors is usually done by considering only factors with Eigen values greater than 1.

Rainfall, rising temperatures and human activities components with Eigen values more than 1 were 30, 6 and 14 items respectively, as indicated in appendix IV (b).

Testing of research hypothesis and multiple regression analysis was done. The results of regressing the three independent variables against tourism development can be seen in the output in table 4.8, 4.9 and 4.10.

4.7 Mean and standard deviation

The mean ranged between 3.575 and 4.22 with standard deviation of 0.704 to 0.452 respectively. This implies that rapid changes in rainfall patterns, rising temperatures and human activities negatively affect tourism development. This is indicated in table 4.7.

Table 4.7: Mean and standard deviation of climatic change on tourism development around LNNP

	Mean	Std. Deviation
Rainfall	3.575	0.704
Temperature	3.605	0.5295
Human activities	4.22	0.452

Source: Field data (2013)

The R = 0.825 shows a positive correlation and R^2 = 68.0% implies that for every percentage increase in climate change it explains 68.0% of tourism development in LNNP explained by the three predictors appearing in table 4.8.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.825[a]	.680	.668	.53414

a. Predictors: (Constant), Human activities, Rising temperature, Rainfall effect

Source: Field data (2013)

The ANOVA table shows that the F value is large, that is 53.88 is significant at p value of .000 levels. The p value is less than 0.05 meaning that the model is good. From the significance tailed p = 0.000 which is < 0.05 and lower than 0.1, where level of significance (0.05), it shows that there is a direct association between climate change and tourism development within LNNP.

Table 4.9: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.117	3	15.372	53.881	.000[a]
	Residual	72.39	254	.285		
	Total	118.507				

a. Predictors: (Constant), Human activities, Rising temperatures, Rainfall effect

b. Dependent Variable: Tourism development

Source: Field data (2013)

Table 4 .10 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.354	.428		.828	.410
	Rainfall effect	.462	.069	.527	6.682	.000
	Rising temperatures	.011	.067	.012	.161	.873
	Human activities	.420	.078	.444	5.370	.000

a. Dependent Variable: Tourism development

Source: Field data (2013)

The multiple regression model is:

$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \ldots\ldots b_nX_n$

Where;

y - Tourism development

a - Intercept

X_1 - Rainfall effects

X_2 - Rising temperatures

X_3 - Human activities

b_nX_n - Error

$y = 0.354 + 0.462x_1 + 0.011x_2 + 0.420x_3 + b_nX_n$

Firstly, as rating for rainfall increases by standard deviation of 0.704, the rating on tourism development increases by 0.462 standard deviation of (0.462 x 0.704). Furthermore, for every 0.704 more rating on rainfall effects, an extra rating of 0.325 is added to the rating of tourism development. This is only true if ratings on rising temperatures and human activities are kept constant.

Secondly, as rating for rising temperatures increases by standard deviation of 0.5, the rating on tourism development increases by 0.011 standard deviation of (0.011 x 0.5). Additionally, for every 0.5 more rating on rising temperatures, an extra rating of 0.0055 is added to the rating of tourism development. This is only true if ratings on rainfall and human activities are kept constant.

Finally but not least, as ratings for human activities increases by standard deviation of 0.452, the rating on tourism development increases by 0.42 standard deviation of (0.42 x 0.452). In addition, for every 0.452 more rating on rainfall effects, an extra rating of 0.189 is added to the rating of tourism development. This is only true if

ratings on rising temperatures and rainfall are kept constant. Finally, the first and last hypothesis (Ho_1 and Ho_3) were significant hence the researcher failed to reject while Ho_3 was not significant hence rejected.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter discusses summary of the findings and conclusions. Finally, recommendations for possible future research have been explored. The purpose of this study was to evaluate the effects of climate change on tourism development around Lake Nakuru National Park.

Analysis of the data and the findings as they relate to the hypothesis are discussed too. The frequencies and percentage tables provided a descriptive statistics of the variables that are most important. Furthermore, multiple regression and chi-square were used in order to examine the relationship between each of the climatic change variables and tourism development variables.

5.1 Summary of the findings

5.1.1 Demographic characteristics

It was established from the study that majority of the respondents were male than female as indicated in table 4.2. This implies that there are more male than female employees in Lake Nakuru National Park which indicate that gender parity is skewed towards male. The study also showed that most respondents fall between the age bracket of 21 - 40 years as shown in table 4.1. This indicates that majority of the employees were aged between the age bracket of 21 - 40 years. This is a prime age for responsible employees to have experience and knowledge on the perceived effects of rapid changes in rainfall patterns on tourism development in Lake Nakuru National Park. On academic qualification, most of the respondents had attained University

level. Lastly on marital status, it was established that majority of the respondents were single as indicated in figure 4.3.

5.1.2 Effects of rapid changes in rainfall patterns on tourism development

5.1.2.1 Frequency of extreme events and changes in consumer trends

For the purpose of summary of the findings, strongly agreed and agreed have been put together under agreed while strongly disagreed and disagreed have been put together under disagreed and in between is neutral. Most respondents strongly agreed that frequency of intensive rainfall affects tourist arrivals as indicated in appendix II. This is in agreement with projections of climate change suggesting that East Africa will experience warmer temperatures and a 5-20% increased rainfall from December-February by 2050 (Hulme *et al*., 2001; IPCC, 2001). Additionally, Clawson (1966) asserts that tourism activities including leisure activities depend on certain weather conditions, mainly described by temperature, duration of sunshine, wind and rain. Furthermore, nicely warm, but not too hot, sunshine and no rain and a light wind seems to be the leisure activity optimum. This confirms that heavy rainfall affects tourist arrivals and satisfaction levels mainly because incidences of intensive rainfall result in floods that definitely hinder or make it difficult to undertake tourism activities for example bird watching or a safari, consequently making the visitors disappointed and dissatisfied. Also, Smith (1993) asserts that poor weather is an important source of dissatisfaction that was identified in a survey of visitors to Scotland.

On the statement that high intensity of extreme storms and wind affects tourist arrivals, most of the respondents agreed as indicated in appendix II. This confirms that high intensity of extreme storms and wind affects tourist arrivals. Mass tourism

continues to seek sun, sea and sand (Aguilo *et al*., 2005). Whereas, most of the tourism activities involving the sun, sea and sand take place outdoor, this implies incidences of extreme wind and storms would hinder or make it difficult for tourism activities such as a safari or sunbathing to be undertaken. Above all, tourism infrastructure and facilities can be damaged by such events of extreme storms and wind. In addition, currently dominant group of international tourist, sun and beach lovers from Western Europe would travel less far or even stay in their home country, implying a fall of total international tourist numbers. The reverse is true for warmer countries, not only would these countries attract less foreign tourists, domestic tourists would be inclined to travel abroad for their holidays. The pattern of international tourism would shift towards higher latitudes and altitudes (Hamilton *et al*., 2005).

Similarly, most respondents agreed with the statement that rapid changes in rainfall patterns would lead to changes in consumer trends hence affecting tourist arrivals as indicated in appendix II. This agrees with Uyarra *et al*., (2005) argument that changed business and destination price structures as a result from climate change may offset increasing transport costs and that the outcome of all of the processes would then be changes in consumer trends focusing on destination attractiveness that becomes the basis for changing demand.

5.1.2.2 Rising costs, reduced attractiveness of tourism destinations and change in visitor's tastes and preferences

Most respondents agreed that rapid changes in rainfall patterns would lead to rise in food, repairs, insurance and rescue costs as indicated in appendix II. This agrees with (ECCK, 2009) that asserts aggregate models indicate additional net economic costs (on top of existing climate variability) could be equivalent to a loss of almost 3% of

GDP each year by 2030 in Kenya. This represents costs associated with damage as a result of droughts and floods.

Also, most respondents strongly agreed that rapid changes in rainfall patterns would lead to reduced attractiveness of tourism destinations as indicated in appendix II. Many aspects of our lives are influenced by the weather and climate, from the crops we grow to the social activities we engage in. In addition, the natural environment and climate conditions are very important in determining the attractiveness of a region as a holiday destination (CCT, 1999). In the same way, (UNEP, 1997) report states that during the 1992 drought, Victoria Falls lost some of its attractiveness because of much reduced water discharge over the falls. This is an indication that reduced attractiveness of tourism destination will consequently affect tourist arrivals and satisfaction levels as destinations become less attractive, visits and satisfaction levels consequently tend to decline. All in all, most of the respondents strongly agreed that rapid changes in rainfall patterns would lead to change in visitors tastes and preferences thereby reducing tourist arrivals as indicated in appendix II.

5.1.2.3 Reduced service quality, changes in quality of tourism products and reduced tourism revenue

More than half of the respondents agreed with statement that rapid changes in rainfall patterns would lead to reduced service quality hence reduced tourist arrivals. Droughts and floods cause damage to tourism infrastructure and facilities for example roads, such incidences reduce satisfaction levels of visitors caused by poor road conditions used by visitors as a result of floods. In addition, rapid changes in rainfall patterns including floods can also affect the planning of tourism programs and daily

operations, tourist's comfort, decisions for trips and the ultimate flow of tourists (Kiprutto *et al.,* 2012).

Also, most respondents agreed that rapid changes in rainfall patterns would result in difficulty in accessing attraction sites by visitors as indicated in appendix II. Furthermore, frequent floods damage roads leading to tourism attractions including tourism facilities. This was evident in Lake Nakuru National Park as one of the buildings that served as management offices was submerged by floods leading to the staff migrating to neighboring offices.

Additionally, most of the respondents agreed that rapid changes in rainfall patterns would lead to changes in quality of tourism products as indicated in appendix II. For instance, the raw sewage that is pumped into the lake has substantially damaged water quality, led to the mass death of lesser flamingos and instigated the species' migration to Lake Bogoria. The bird deaths have been attributed to poisoning by heavy metals, pesticides and algal toxins, bacterial infection and malnutrition (Ndetei and Muhandiki, 2005).

Nevertheless, most of the respondents agreed that rapid changes in rainfall patterns would lead to reduced tourism earnings as indicated in appendix II. This agrees with Beritella *et al.,* (2004) arguing that 10% of the world GDP is now spent on recreation and tourism, however, climate change will probably not affect the amount of money spent but rather where it is spent. In addition, most of the respondents agreed that rapid changes in rainfall patterns reduce tourism revenue as indicated in appendix II. This is in agreement with Bigano *et al.,* (2006) asserting that climate change could negatively affect countries and regions that depend heavily on incomes from tourism and could also bring benefits to places that are currently not popular with tourists.

Thus, among the many impacts that climate change can have on the economy, the impact on tourism activities is one of the most important. In the same way, climate conditions are obviously crucial in determining tourism destination choices, so any change in climate conditions will have consequences in terms of number of incoming or outgoing tourists, tourism revenues, consumption patterns, income and welfare (Roson and Sartori, 2012).

5.1.2.4 Reduced seasonality and unfavourable climatic conditions

Majority of the respondents agreed that rapid changes in rainfall patterns could result in reduced seasonality as indicated in appendix II. On the other hand, most respondents agreed that rapid changes in rainfall patterns could result in unfavorable climatic conditions. Climate acts as a facilitator that makes tourism activities possible and enjoyable (Martin, 2005). This implies that unfavorable climatic conditions for example intensive rainfall derails tourist activities hence dissatisfied visitors and reduced arrivals too.

5.1.2.5 Degradation of tourism infrastructure, wildlife migration and decline in biodiversity

Majority of the respondents agreed that rapid changes in rainfall patterns result in degradation of tourism facilities and infrastructure as indicated in appendix II. Incidences of intensive rainfall result in floods and storms that damage roads, buildings and tourism facilities rendering the tourists dissatisfied hence visitors are forced to seek alternative tourism destinations.

On whether rapid changes in rainfall patterns could lead to wildlife migration, most of the respondents agreed that rapid changes in rainfall patterns would lead to wildlife migration. In addition, most respondents agreed that rapid changes in rainfall patterns

could lead to decline in biodiversity. This show that most of the respondents agreed that rapid changes in rainfall patterns would lead to decline in biodiversity. This agrees with Scott *et al.*, (2007) asserting that climate change affects tourism development by affecting the natural resources on which tourism is based. For instance, the tourism industry in Kenya that is heavily nature based.

5.1.2.6 Flight cancellations, closure of transportation routes and disruption of water operations

Most respondents strongly agreed that cancellation of flights due to bad weather affects tourist arrivals as shown in appendix II. This implies that majority of the respondents supported that cancellation of flights due to bad weather would result in decline of tourist arrivals. Also, most of the respondents strongly agreed that roads, trucks and bridges closed was as a result of rapid changes in rainfall patterns as indicated in appendix II. This implies that roads and bridges closed as a result of intensive rainfall could lead to reduced tourist arrivals. Additionally, most respondents agreed that disruption of water operations due to rising or decreasing water levels affects tourist arrivals. This shows that a high or low water level affects tourism operations through incidences of flooding for high water levels and drought for low water levels. Tourist numbers would definitely reduce in countries or regions experiencing drought or floods.

5.1.2.7 Disruption of tourism activities and water shortage

On the statement that cancellation of tourism activities for example a safari would occur due to rapid changes in rainfall patterns hence reduced tourist arrivals, most of the respondents agreed with the statement as indicated in appendix II. This indicates that cancellation of tourism activities would occur as a result from rapid changes in

rainfall patterns. Also, most of the respondents agreed that evacuation of tourists in the advent of floods affects tourist arrivals. Additionally, on the statement that water shortage affects tourist arrivals, most of the respondents agreed with the statement that water shortage affects tourist arrivals as shown in appendix II. This agrees with Trapper (2011) asserting that some regions of the globe are expected to see increases in water availability, while other regions may have to cope with reduced water resources and situations of drought due to climate change.

5.1.2.8 Increased human wildlife conflict, increased poaching, frequent forest fires and interrupted supply chain of food

Most of the respondents agreed that increased human wildlife conflict would result from rapid changes in rainfall patterns. Also, most of the respondents agreed with the statement that increased poaching affects tourist arrivals as shown in appendix II. Furthermore, on the statement that frequent forest fires including heat waves affects tourist arrivals, most of the respondents agreed with the statement that frequent forest fires affects tourist arrivals. This agrees with (Becken, 2010) asserting that hot weather conditions increase the risk of forest fires. Additionally, hot weather conditions result in heat waves hence sunburns, thus reducing arrivals to tourism destinations experiencing heat waves. Similarly, heat waves could result to forest fires. Most important, in Greece, after the devastating fires of summer 2000, more than half of all tourist bookings for 2001 were cancelled. Similarly, drought in the State of Colorado (USA) in 2002 created dangerous wildfire conditions and visitor numbers declined by 40% in some areas, largely as a result of media coverage and perceived risks by tourists (Scott and Lemieux, 2009).

Also, most respondents agreed that interrupted supply chain of food affects tourist arrivals as indicated in appendix II. This indicates that majority of respondents agreed that interruption of supply chain of food affects tourist arrivals. Climate change may affect food production, cause hunger, health problems, difficulty to access energy and water, therefore poverty in many countries as a result of climate change (IRI, 2005). Additionally, most of the respondents strongly agreed that decline of landscape aesthetic affects tourist arrivals. Climate change will negatively affect landscape aesthetic through incidences of drought, forest fires and floods. For instance, floods bring about landslides and clearance of vegetation resulting to reduced landscape aesthetic.

5.1.3 Perceived effects of rising temperatures on tourism development

Most of the respondents agreed that rising temperatures would affect tourism operations as shown in table 4.6. This implies that majority of respondents supported that rising temperatures would affect tourism operations. Apparently, periods and incidences of rising temperatures increase the risks of fire by influencing flammability causing forest fires hence biodiversity loss. Also, most respondents strongly agreed that extreme sunshine would affect tourism operations. Similarly, winter resorts and many beach tourist destinations also depend on favorable climatic conditions for example sunshine, no precipitation and no wind (Scott *et al.,* 2008; Moscardo *et al*., 2001). This shows that majority of respondents strongly agreed that extreme sunshine would affect tourism operations for example rising temperatures as a result of extreme sunshine that increase the need for cooling hence costs for air conditioning. Thus, operational and maintenance costs are expected to increase substantially under different rising temperatures scenarios.

On the statement that poor air quality would affect tourism operations, most of the respondents agreed to the statement that poor air quality would affect tourism operations. This indicates that majority of respondents agreed with the statement. Temperatures have been rising globally by about 0.74ºC on average in the last 100 years (IPCC, 2007). This implies that several aspects of tourism operations, for instance choice of a holiday destination will be negatively affected by rising temperatures including forest fires and heat waves thereby negatively affecting tourism development. Also, holiday destinations experiencing relatively rising temperatures would experience a reduction in arrivals as holiday destinations with favorable temperatures will have more arrivals. This agrees with Uyarra *et al.,* (2005) asserting that warm temperatures, clear waters and low health risks were also found to be the most important environmental features influencing the choice of holiday destination for tourists of two Caribbean islands, Bonaire and Barbados.

5.1.4 Perceived effects of human activities on tourism development

Most respondents agreed that reduced attractiveness of tourism destinations result from human activities affect tourism development as indicated in table 4.7. This implies that reduced attractiveness of tourism destinations as a result from human activities for example deforestation would negatively affect tourism development. Illegal logging, clearance of forests for agriculture and human settlement result in reduced flora and fauna that negatively affect tourism development in Kenya that is dependent on nature. This agrees with (UNEP, 1997) report that asserts during the 1992 drought, Victoria Falls lost some of its attractiveness because of much reduced water discharge over the falls.

On the statement that there is need to reduce tourism greenhouse gases, majority of the respondents agreed with the statement. This indicates that there is need to reduce tourism greenhouse gases that contribute to climate change hence affecting natural tourism resources. (Agnew and Viner, 1999) assert that since the start of the industrial revolution vast quantities of carbon dioxide and other greenhouse gases have been released into the atmosphere by the burning of fossil fuels, most notably coal and oil and to a lesser extent, gas. This has led to an increase in the atmospheric concentration of carbon dioxide from 280ppm (parts per million) to its present level of 355ppm. Carbon dioxide is one of the main greenhouse gases, along with water vapor. As a result of the increasing concentration of this gas, longer wave radiation from the earth is absorbed, thus reducing the energy lost to space and so altering the natural balance between incoming and outgoing radiation, hence climate change.

Most respondents agreed to the statement that human activities would lead to poor health of key wildlife species. This implies that majority of respondents supported that poor health of key wildlife species result from human activities. This is in agreement with (Becken, 2010) asserting that changing ecological conditions, such as precipitation, evaporation and flowering time have the potential to threaten wildlife species populations or induce a shift in distributions and migration patterns.

On the statement that human activities would lead to ecological destruction, most of the respondents agreed with the statement as indicated in table 4.7. This implies that most respondents agreed that human activities would lead to ecological destruction. This is in agreement with (Sindiga, 1995) and (Mwale, 2000) asserting that human encroachment on critical biodiversity depository sites in search of agricultural land has continued since the 1970’s and 1980’s. They continue and argue that this has

created a myriad of problems like competition for water resources, human wildlife conflicts, habitat fragmentation and blocking of wildlife migratory routes.

In addition, most respondents strongly agreed that human activities would lead to desertification. Also, on the statement that human activities would lead to increase of endangered species, most of the respondents strongly agreed to the statement. Moreover, ecological destruction including illegal logging, clearance of forests for human settlement and agriculture affects natural tourism resources in various ways for example human wildlife conflict that result to death of wildlife species. Furthermore, desertification in National parks and other tourism destinations caused by human activities leads to loss of aesthetic beauty negatively affecting the tourism industry. This is supported by (Price, 2003) asserting that forests have undergone massive destruction at local, regional and global scales as a result of human activities, yet they provide a wide range of benefits to both mountains and downstream populations, notably the protection of watershed, as centers of biodiversity and supports important resources for tourism and recreation among other benefits.

Furthermore, most of the respondents agreed that human activities would lead to fragile habitat for wildlife. This implies that majority of respondents supported that human activities would result to fragile habitat for wildlife. Human activities continue to disturb the natural environment and result in climate change or causing pollution. Such human activities include illegal logging, clearance of forest for agriculture and settlement and burning of fossil fuels among many other human activities. Additionally, most of the respondents agreed that human activities would lead to visual pollution. This show that majority of respondents strongly agreed that human activities would lead to visual pollution. Similarly, on the statement that human

activities would result in biodiversity loss, most of the respondents agreed with the statement. This implies that most respondents agreed that human activities would lead to biodiversity loss. Finally, most respondents strongly agreed that human activities for example use of non-renewable sources of energy result in climate change, as shown in table 4.7. This show that majority of respondents strongly agreed that human activities for example use of non-renewable sources of energy result in climate change hence affecting natural tourism resources. Therefore, tourism activities should shift to use of renewable sources of energy (green energy) such as solar so as to reduce green house gas emissions for example carbon dioxide that contribute in causing climate change.

5.1.5 Effects of climate change on tourism development

Regression analysis was conducted to determine which variable or combinations of variables were the best predictors of the positive influence on tourism development. The F-test associated with the ANOVA table is used to test the null hypothesis that the independent variables are significant to the model of analysis.

The summary output when all the three (3) independent variables are included in the forward linear regression equation leads to the Analysis of Variance (ANOVA) which is used to test the null hypothesis that the independent variables are significant to the model of analysis. The dependent variable used in the analysis was tourism development and the independent variables were rainfall effects, rising temperatures and human activities. A forward regression analysis was conducted to determine which variable or combinations of variables were the best predictors of the positive tourism development. When the forward regression was run, the model summary, R = .825 and R^2 = 68.0%, this implies that for every percentage increase in climate change

it explains 68.0% of tourism development in LNNP. The remaining 32.0% can be explained by inherent variability or lurking variable. Therefore, the researcher concludes that there is a significant effect of climate change on tourism development in LNNP. Since 68.0% is more than the accepted percentage of social science of 65.0%.

The ANOVA table shows the F value of 53.881 is significant at .0001 levels. The results of the three independent variables that were entered into the regression model shows R(.825) as the correlation of the three independent variables with dependent variable, after all the inter correlations among the three independent variables were taken into account.

5.2 Conclusions

The research findings indicate the perceived effects of climate change on tourism development. The findings indicate that rapid changes in rainfall patterns, rising temperatures and human activities affects tourism development. This is evident in descriptive analysis, correlation analysis and multiple regression analysis.

Therefore, the fact that climate change is already having a negative impact on tourism development is no longer an issue to be challenged. For instance, in the year 2003, a heat wave killed hundreds of people in France, Paris.

The African continent including Kenya is being heavily impacted by climate change mainly because of low level of economic development, and lack of capacity to respond robustly and to adapt when climate changes strike. Many important African cities including Mombasa that forms an important tourist destination in Kenya face the immediate threat from climate change that is sea level rise. In addition sea level

rise is linked to flooding in all low lying areas with devastating effects on local economies that depend on tourism. Scientist predict a modest sea level rise of 50 centimeters by 2050 will expose the lives of 150 million people globally. This scenario was evident in Lake Nakuru National Park where one of the management buildings was submerged with water due to rising sea level prompting occupants of the submerged building to move to neighboring offices. Furthermore, coastline lands that host vital tourism facilities face the risk of silting on the one hand and to erosion on the other hand. Most important, during droughts, water stress will increase dramatically negatively affecting operations of tourism establishments such as hotels, restaurants, cottages and base camps.

The country should explore all alternatives to adapt to the negative effects of climate change. Equally important, a need exists for humankind to confront global warming urgently. Furthermore, inhabitants of the planet Earth should reduce excessive use of resources, particularly non-renewable fossil fuels.

5.3 Recommendations

a. To begin with; indicators of climate change include floods, droughts, increased greenhouse gas emissions and temperature changes. Potential use of these indicators must be initiated including alerting decision makers in government (policy makers), tourism industry, research and civil society organizations and global community to prioritize issues, guide policy formulation and foster common understanding with a view to initiating action of curbing adverse effects of climate change.

b. Furthermore, promotion of clean, secure and sustainable energy particularly renewable energy sources such as geothermal, windmills, and solar power. This will help in a large way in mitigation of greenhouse gas emissions from the tourism sector (especially from transport and accommodation activities) that contributes to a large extend in causing climate change.

c. Sustainable use of water through recycling and promotion of water conservation and efficiency measures in tourism facilities minimizing environmental pollution and damage.

d. Promotion and use of appropriate building materials and technologies for example green buildings this is because buildings emit greenhouse gas that in turn contribute in causing climate change.

e. In addition, adoption to climate change provides the most relevant focus for development research that may improve the livelihoods of the poor and the most vulnerable (Cooper, 2004).

f. Therefore, all tourism stakeholders need to seek alternative ways and means of carrying out tourism operations taking into account cutting down greenhouse gases that contribute largely to climate change.

g. Furthermore, indicators will also be useful in determining mitigation options and capacity required to increase the knowledge and understanding to combat climate change effects on tourism development.

h. Additionally, applying existing and new technologies to improve energy efficiency, securing financial resources to assist poorer regions and countries manage climate change effects on tourism development would in a large extend help combat climate change effects.

i. Over and above, a balance should be achieved in economic and social circles with regard to exploitation of natural resources, energy production and utilization, disposal of wastes, international trade and technological transfer.

5.4 Suggestions for further research

This research focused on arrivals, tourism operations and natural tourism resources. All aspects related to climate change effects on tourism development need to be examined so as to wholly combat climate change effects. A need exist to further research on policies and laws touching on climate change effects in Kenya so that climate change effects can effectively be dealt with when proper laws and policies are in place. Lastly but not least, research into understanding tourist's perceptions and reactions to the impacts of climate change need to be urgently addressed including traveler's attitudes towards climate change, business owner attitudes and their willingness to address climate change effects. Finally, research into calculations that determine the amount of green house gas the tourism industry emits need to be done so as to reduce that particular amount.

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APPENDICES

Appendix 1: Questionnaire for staff and locals of Lake Nakuru National Park

(Please follow the instructions below carefully when completing this questionnaire)

Questionnaire Number…….

Interview Date……...

Dear Respondent,

All information in this questionnaire will be very important in determining climate change effects on visitor's arrivals, natural tourism resources (water, landscape and biodiversity), tourism operations and visitors satisfaction levels. There are four parts on the questionnaire: Section A, B, C and D. Kindly fill and complete all the parts of the questionnaire. Section A is on general information, section B, effects of rainfall on tourist arrivals, section C, effects rising temperatures on tourism operations, and lastly, section D on effects of human activities on natural tourism resources (water, energy, landscape and biodiversity). The information given will be confidential.

SECTION A: General Information

1. Age (Tick one):

(01) Below 20 years (02) 21-40 years

(03) 41-60 years (04) Above 60 years

2. Sex (Tick one):

(01) Male (02) Female

3. Marital Status (Tick one):

(01) Married (02) Single (03) Divorced/ Separated

(04) Any other (specify) _____

4. Educational level (Tick one)

(01) Illiterate/None (02) Primary (03) Secondary

(04) College (05) University

(06) Any other (specify) _____

5. Occupation (Tick one)

(01) Unemployed (02) Self- employed

(03) Salaried/formal employment (04) Farmer

(05) Any other (specify) _____

SECTION B.

Using the guide to responses given below, please TICK where appropriate in the table the answer that best describes your opinion on the statements given.

1- Strongly Disagree (SD)

2- Disagree (D)

3- Neutral (N)

4- Agree (A)

5- Strongly Agree (SA)

Rapid changes in rainfall patterns affect tourist arrivals in LNNP through:

	SD	**D**	**N**	**A**	**SA**
6. Periodic floods and droughts (extreme events)	1	2	3	4	5
7. Increasing frequency and intensity of extreme wind	1	2	3	4	5
8. Increased frequency of intensive rainfall	1	2	3	4	5
9. Increased frequency and intensity of extreme storms	1	2	3	4	5
10. Changes in consumer trends	1	2	3	4	5
11. Reduced attractiveness of attractions/destinations	1	2	3	4	5
12. Rise in food, repairs, insurance and rescues costs	1	2	3	4	5
13. Reduced attractiveness of tourism destinations	1	2	3	4	5
14. Changes in visitors tests and preferences	1	2	3	4	5
15. Reduced service quality	1	2	3	4	5

16. Difficulty in accessing attraction sites by visitors	1	2	3	4	5
17. Changes in quality of tourism products	1	2	3	4	5
18. Reduced tourism earnings and jobs	1	2	3	4	5
19. Reduced tourism revenues	1	2	3	4	5
20. Reduced seasonality	1	2	3	4	5
21. Unfavorable climatic conditions	1	2	3	4	5
22. Degradation of tourism facilities/infrastructure	1	2	3	4	5
23. Changes in wildlife migration patterns	1	2	3	4	5
24. Decline in biodiversity	1	2	3	4	5
25. Cancelled/delayed flights due to bad weather conditions	1	2	3	4	5
26. Roads and bridges closed	1	2	3	4	5
27. Disruption of water operations due to high water levels	1	2	3	4	5
28. Cancellation of tourism activities such as a safari	1	2	3	4	5
29. Evacuation of tourists in the advent of floods	1	2	3	4	5
30. Water shortages	1	2	3	4	5
31. Increased human wildlife conflict	1	2	3	4	5
32. Increased poaching	1	2	3	4	5
33. Frequent forest fires	1	2	3	4	5
34. Interrupted of supply chain (food)	1	2	3	4	5
35. Decline of landscape aesthetic	1	2	3	4	5

SECTION C:

Use the key to responses given below to TICK on the appropriate responses to questions 36 to 41

1-Strongly Disagree (SD)

2-Disagree (D)

3-Neutral (N)

4-Agree (A)

5-Strongly Agree (SA)

Rising temperatures would affect tourism operations in LNNP through:

	SD	**D**	**N**	**A**	**SA**
36. High operation and maintenance costs	1	2	3	4	5
37. Difficulty in undertaking a safari	1	2	3	4	5
38. Heat waves	1	2	3	4	5
39. Extreme high temperatures	1	2	3	4	5
40. Poor air quality	1	2	3	4	5
41. Increased drought events	1	2	3	4	5

SECTION D:

Use the key to responses given below to TICK on the appropriate responses for questions 42 to 56

1-Strongly Disagree (SD)

2-Disagree (D)

3-Neutral (N)

4-Agree (A)

5-Strongly Agree (SA)

Human activities would affect natural tourism resources (water, energy and biodiversity) in LNNP through:

	SD	**D**	**N**	**A**	**SA**
42. Reduced investments in tourism development	1	2	3	4	5
43. Reduced tourism products/activities in a destination	1	2	3	4	5
44. Reduced attractiveness of attractions	1	2	3	4	5
45. Reduced attractiveness of tourism destinations	1	2	3	4	5
46. Higher demand for air conditioning	1	2	3	4	5
47. Increased currency leakage	1	2	3	4	5
48. Need to reduce tourism related greenhouse gas emissions	1	2	3	4	5
49. Poor health of key wildlife species	1	2	3	4	5
50. Ecological destruction	1	2	3	4	5
51. Desertification	1	2	3	4	5
52. Rise in endangered species	1	2	3	4	5
53. Fragile habitat for wildlife	1	2	3	4	5
54. Visual pollution	1	2	3	4	5
55. Biodiversity loss	1	2	3	4	5
56. Rise in food, repairs, insurance and rescues costs	1	2	3	4	5

Appendix II: Effects of rapid changes in rainfall patterns on tourists arrivals in LNNP

Rainfall affects tourist arrivals in LNNP through	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
	%	%	%	%	%	%
Frequency of intensive rainfall	0	0	25	35	40	100
Intensity of extreme storm	6	14	10	45	25	100
Changes in consumer trends	5	10	5	40	40	100
Rise in food, repairs, insurance and rescue costs	5	0	15	55	25	100
Reduced attractiveness of tourism destination	8	5	5	37	45	100
Change in visitors tastes and preferences	5	0	20	30	45	100
Reduced services quality	6	0	9	55	30	100
Difficulty in accessing attraction sites by visitors	5	0	5	45	45	100
Changes in quality of tourism products	0	0	20	55	25	100
Reduced tourism earnings	12	0	15	38	35	100
Reduced tourism revenue	8	2	10	45	35	100
Reduced seasonality	5	0	5	65	25	100
Unfavorable climatic conditions	10	5	5	45	35	100
Degradation of tourism facilities and infrastructure	5	0	0	60	35	100
Changes in wildlife migration pattern	6	0	4	50	40	100
Decline in biodiversity	5	0	25	35	35	100

Source: Field data (2013)

Rainfall affects tourist arrivals in LNNP through	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
	%	%	%	%	%	%
Cancellation of flights due to bad weather	0	5	25	35	35	100
Roads and bridges closed due to bad weather	5	5	5	35	50	100
Disruption of water operations due to water levels	0	10	10	60	20	100
Cancellation of tourism activities such as a safari	0	0	20	55	25	100
Evacuation of tourists in the advent of floods	0	10	5	50	35	100
Water shortage	0	15	15	40	30	100
Increased human wildlife conflict	5	0	10	45	40	100
Increased human wildlife conflict	0	0	40	40	20	100
Frequent forest fires	0	5	30	40	25	100
Interrupted of supply chain of food	5	0	10	65	20	100
Decline of landscape aesthetic	0	5	20	35	40	100

Source: Field data (2013)

Appendix III: Relationship between rainfall and tourism development

Rapid changes in rainfall patterns affects tourist arrivals in LNNP through	Chi-Square	df	Asymp. Sig.
Periodic floods and drought	57.600[a]	3	.000
Intensity of extreme wind	27.200[a]	3	.000
Frequency of intensive rainfall	2.800[b]	2	.247
Intensity of extreme storm	40.000[c]	4	.000
Changes in consumer trend	54.000[c]	4	.000
Reduced attractiveness of attractions and destination	27.200[a]	3	.000
Rise in food, repairs, insurance and rescue costs	44.800[a]	3	.000
Reduced attractiveness of tourism destination	68.000[b]	4	.000
Change in visitors tastes and preferences	27.200[a]	3	.000
Reduced services quality	49.600[a]	3	.000
Difficulty in accessing attraction sites by visitors	51.200[a]	3	.000
Changes in quality of tourism products	17.200[c]	2	.000
Reduced tourism earnings	32.000[a]	3	.000
Reduced tourism revenue	56.000[b]	4	.000
Reduced seasonality	76.800[a]	3	.000
Unfavorable climatic conditions	56.000[b]	4	.000
Degradation of tourism facilities and infrastructure	36.400[c]	2	.000
Changes in wildlife migration pattern	52.800[a]	3	.000
Decline in biodiversity	52.800[a]	3	.000
Cancellation of flights due to bad weather	19.200[a]	3	.000
Roads, tracks and bridges closed	72.000[b]	4	.000
Disruption of water operations due to water levels	86.000[b]	4	.000
Cancellation of tourism activities such as a safari	17.200[c]	2	.000

Evacuation of tourists in advent of floods	43.200[a]	3	.000
Water shortage	14.400[a]	3	.002
Increased human wildlife conflict	40.000[a]	3	.000
Increased poaching	6.400[b]	2	.041
Frequent forest fires	20.800[a]	3	.000
Interrupted of supply chain of food	72.000[a]	3	.000
Decline of landscape aesthetic	24.000[a]	3	.000

Source: Field data (2013)

Appendix IV: Factor Analysis Results

(a) Communalities

Component	Initial Eigen Values	Extraction
Rainfall Effects		
Periodic floods and drought	1.000	.886
Intensity of extreme wind	1.000	.911
Frequency of heavy rainfall	1.000	.949
Intensity of extreme storm	1.000	.974
Changes in consumer trend	1.000	.878
Reduced attractiveness of attractions and destination	1.000	.993
Rise in food, repairs, insurance and rescue costs	1.000	.936
Reduced attractiveness of tourism destination	1.000	.945
Change in visitors tastes and preferences	1.000	.984
Reduced services quality	1.000	.934
Difficulty in accessing attraction sites by visitors	1.000	.983
Changes in quality of tourism products	1.000	.946
Reduced tourism earnings	1.000	.903
Reduced tourism revenue	1.000	.891
Reduced seasonality	1.000	.965
Unfavorable climatic conditions	1.000	.967
Degradation of tourism facilities and infrastructure	1.000	.933
Changes in wildlife migration pattern	1.000	.967
Decline in biodiversity	1.000	.992
Cancellation of flights due to bad weather	1.000	.958
Roads, trucks and bridges closed	1.000	.961
Disruption of water operations due to water levels	1.000	.932
Cancellation of tourism activities such as a safari	1.000	.991
Evacuation of tourists in advent of floods	1.000	.919
Water shortage	1.000	.844
Increased human wildlife conflict	1.000	.938
Increased poaching	1.000	.943
Frequent forest fires	1.000	.965
Interrupted of supply chain of food	1.000	.946

Decline of landscape aesthetic	1.000	.909
Rising temperatures		
High operation and maintenance costs	1.000	.876
Hot temperatures	1.000	.968
More frequent heat waves	1.000	.995
Extreme sunshine	1.000	.893
Poor air quality	1.000	.943
Increased ultraviolet radiation	1.000	.885
Human activities		
Reduced investments in tourism development	1.000	.950
Reduced tourism products, activities in destination	1.000	.957
Reduced attractiveness of destination	1.000	.978
Reduced attractiveness of tourism destination	1.000	.986
High demand for air conditioning	1.000	.962
Increased currency leakage	1.000	.936
Need to reduce tourist greenhouse gases	1.000	.917
Lead to poor health of key wildlife	1.000	.976
Lead to ecological destruction	1.000	.970
Lead to desertification	1.000	.948
Lead to increase of endangered species	1.000	.980
Lead to fragile habitat for wildlife	1.000	.970
Lead to visual pollution	1.000	.930
Lead to biodiversity loss	1.000	.964
Use of renewable sources of energy	1.000	.947

Extraction Method: Principal Component Analysis
Source: Field data (2013)

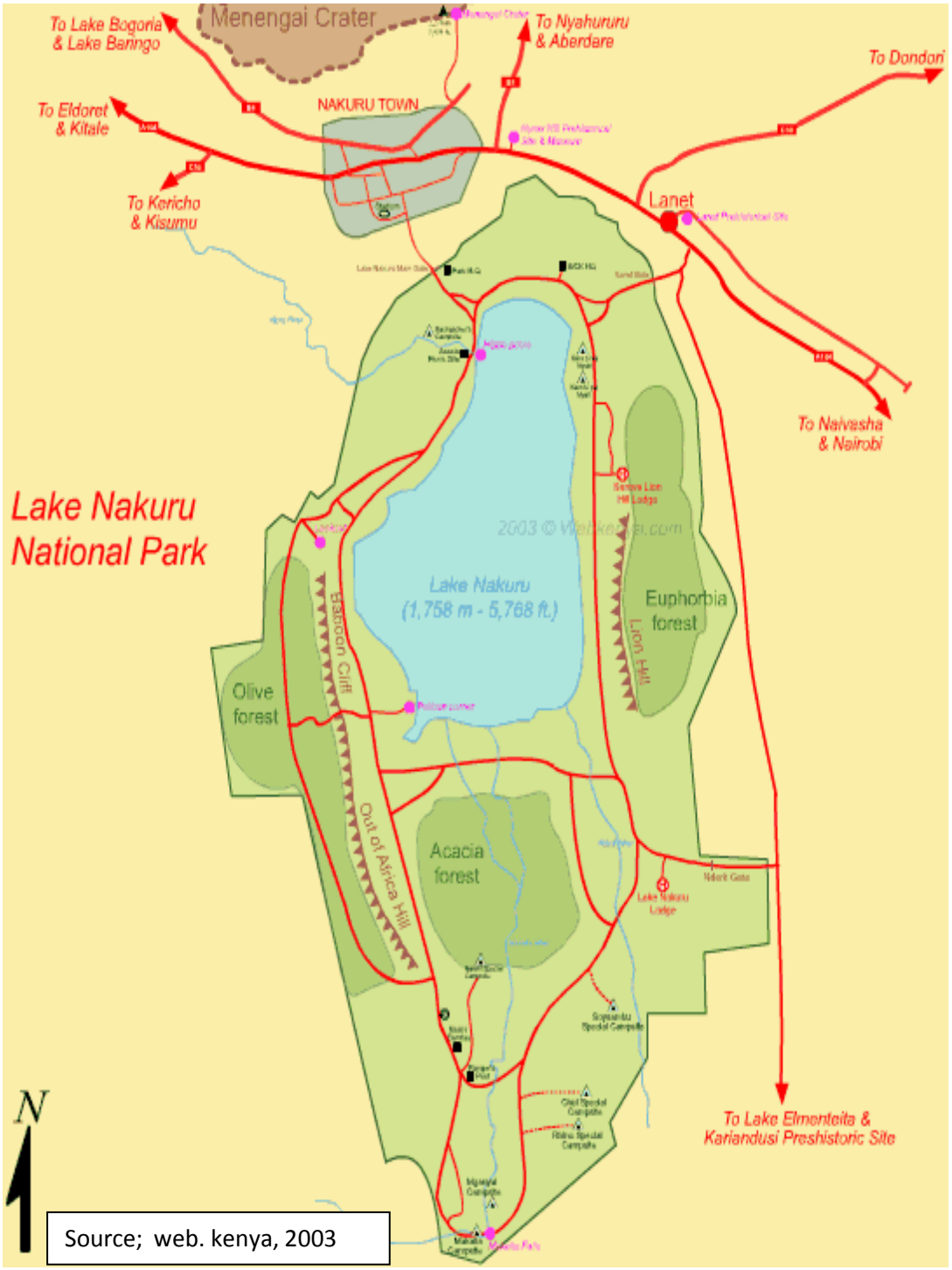
b) Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Rainfall						
1	1.890	2.622	18.457	1.890	2.622	18.457
2	1.809	2.509	20.966	1.809	2.509	20.966
3	1.798	2.494	23.46	1.798	2.494	23.46
4	1.756	2.436	25.896	1.756	2.436	25.896
5	1.704	2.364	28.26	1.704	2.364	28.26
6	1.690	2.344	30.604	1.690	2.344	30.604
7	1.560	2.164	32.768	1.560	2.164	32.768
8	1.479	2.052	34.820	1.479	2.052	34.820
9	1.323	1.835	36.655	1.323	1.835	36.655
10	1.309	1.816	38.471	1.309	1.816	38.471
11	1.289	1.788	40.259	1.289	1.788	40.259
12	1.204	1.670	41.929	1.204	1.670	41.929
13	1.198	1.662	43.591	1.198	1.662	43.591
14	1.187	1.647	45.238	1.187	1.647	45.238
15	1.166	1.617	46.855	1.166	1.617	46.855
16	1.157	1.605	48.460	1.157	1.605	48.460
17	1.153	1.599	50.059	1.153	1.599	50.059
18	1.151	1.597	51.656	1.151	1.597	51.656
19	1.109	1.538	53.194	1.109	1.538	53.194
20	1.100	1.526	54.720	1.100	1.526	54.720
21	1.099	1.524	56.244	1.099	1.524	56.244
22	1.097	1.522	57.766	1.097	1.522	57.766
23	1.092	1.515	59.281	1.092	1.515	59.281
24	1.091	1.513	60.794	1.091	1.513	60.794
25	1.090	1.512	62.306	1.090	1.512	62.306
26	1.089	1.511	63.817	1.089	1.511	63.817
27	1.087	1.508	65.325	1.087	1.508	65.325
28	1.085	1.505	66.830	1.085	1.505	66.830
29	1.083	1.502	68.332	1.083	1.502	68.332
30	1.081	1.499	69.831	1.081	1.499	69.831
Temperature						
1	1.060	1.470	71.301	1.060	1.470	71.301
2	1.059	1.469	72.770	1.059	1.469	72.770
3	1.053	1.461	74.231	1.053	1.461	74.231
4	1.052	1.459	75.690	1.052	1.459	75.690
5	1.049	1.455	77.145	1.049	1.455	77.145
6	1.047	1.452	78.597	1.047	1.452	78.597
Human activities						
1	1.044	1.448	80.045	1.044	1.448	80.045
2	1.041	1.444	81.489	1.041	1.444	81.489
3	1.039	1.441	82.930	1.039	1.441	82.930
4	1.037	1.438	84.368	1.037	1.438	84.368
5	1.036	1.437	85.805	1.036	1.437	85.805

6	1.034	1.434	87.239	1.034	1.434	87.239
7	1.032	1.432	88.671	1.032	1.432	88.671
8	1.030	1.429	90.188	1.030	1.429	90.188
9	1.029	1.427	93.340	1.029	1.427	93.340
10	1.027	1.400	94.700	1.027	1.400	94.700
11	1.025	1.422	96.122	1.025	1.422	96.122
12	1.023	1.419	97.441	1.023	1.419	97.441
13	1.022	1.418	98.959	1.022	1.418	98.959
14	1.010	1.041	100	1.010	1.041	100

Extraction Method: Principal Component Analysis
Source: Field data (2013)

Appendix 5: Study Area



Source; web. kenya, 2003