NATIONAL DEFENCE UNIVERSITY-KENYA

INFLUENCE OF CLIMATE CHANGE ON HUMAN SECURITY IN TSAVO CONSERVATION AREA, KENYA

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OCTOBER, 2023

DECLARATION

This thesis is my original work and to the best of my knowledge has not been presented for a degree award in any other institution.

Signed: _____ _ Date __17th October 2023_____

Jane Franciscah Wamboi

Supervisor

This thesis has been submitted for review with my approval as the assigned supervisor.

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DEDICATION

This thesis is dedicated to my daughters Faith Njoki Kisio and Maureen Nyambura who have been a constant source of love, inspiration, and motivation throughout my academic journey.

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ABSTRACT

The purpose of this study was to examine the influence of climate change on human security in the Tsavo Conservation Area in Kenya. The specific objectives of the study were to analyze the climate change profile in the Tsavo conservation area, to investigate the human security concerns in in Tsavo conservation area, and to determine the link between the climate change profile and the human security in the Tsavo Conservation Area. The study was anchored on human security theory and social security theory. The study employed a mixed-methods approach, including both qualitative and quantitative data collection and analysis methods. The sample for the study included 3 staff from the Ministry of Tourism and Wildlife, 4 staff from the Kenya Wildlife Service (Headquarters), 4 staff from the Kenya Wildlife Service in TCA, 6 staff from the Kenya Wildlife Research and Training Institute, 9 opinion leaders from the community and 384 Community Members living adjacent to TCA. The study applied questionnaires, interview schedules, and focused group discussions. Before actual data collection pilot tests were conducted to ascertain reliability and validity aspects. Data collection involved both administration of google-survey questionnaire using a computerized data kit as well as face-to-face interviews and group discussions. Data that was collected was analyzed using both qualitative and quantitative techniques. Findings were presented in tables, pie charts, bar-graphs, and narratives. The study received a 100% response rate. The study found that the Tsavo climate profile was characterized by declining rainfall, rise in temperatures, changes in weather patterns that were hard to predict, and draught. The study revealed that there were multiple human security concerns in the Tsavo conservancy area including food shortage, water shortage and poor quality of water, displacement, and migration, declining economic opportunities, changes in biodiversity and ecosystems, and changes in cultural activities. Lastly, the study revealed that climatic changes had influenced human security profoundly where climatic changes had resulted in food problems, poor quality of drinking water, increase in conflicts and personal security concerns, deteriorations in the health of residents, and decline of economic opportunities. The study concluded that climate change had influenced human security to a great extent. The study recommended strengthening of education and awareness platforms on climate change, application of sustainable practices in food production, collaboration with both local and international community to leverage adaptation and mitigation mechanisms which include, diversification of livelihoods, water harvesting, and plans on how to handle displacements.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASALs	Arid and Semi-Arid Lands
GHG	Green House Gases
GoK	Government of Kenya
IPCC	Intergovernmental Panel on Climate Change
KFSSG	Kenya Food Security Steering Group
KNCCAP	Kenya National Climate Change Adaptation Plan
KWS	Kenya Wildlife Service
MTEF	Medium Term Expenditure Framework
NCCRS	National Climate Change Response Strategy
NGOs	Non-Governmental Organization
SDGs	Sustainable Development Goals
TCA	Tsavo Conservation Area
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WCMD	Wildlife Conservation Management Department

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This section provides a context of the study, the problem statement, research questions, research objectives, justification, Literature review, theoretical framework, hypothesis, and finally a summary of the chapter.

1.1 Background to the Study

Climate change has become one of the most defining and pressing concerns in the 21st century, with its effects profoundly reshaping the earth's ecosystem. While climate change has taken place throughout history its pace of change has however accelerated in the past century. The change has to do with human activities which has seen the global average temperature rise by a staggering 0.9°C since the nineteenth century. A rise in greenhouse gas emissions into the atmosphere is primary the cause, with the prediction that by 2050 the temperature could on average rise by 1.5°C or more, given the ongoing deforestation activities, and water, soil, and air pollution[1].

[1] "Daoudy, Marwa. *The origins of the Syrian conflict: Climate change and human security*. Cambridge University Press, 2020".

Climate change has brought devastating consequences with the effects being felt through draughts, floods, high heat waves, and erratic precipitation patters[2]. According to the Weather, Climate, and Catastrophe Insight, in the year 2018 alone a loss of $ 225 billion was reported on natural disasters that were 95% triggered by climate change. On average since 2016 losses associated with natural calamities (cyclones, drought, and floods) have led to a loss of more than $200 billion each year with causes certainly related to changes in weather patterns. The immediate effects of climate change have been felt in agriculture and food. By 2050 world's population is projected to reach a staggering 9.7 billion, and the impeding surge in population growth is anticipated to put pressure on demands for food production[3].

However, the available arable lands are grappling with the negative effects of climate change. Rise in temperatures, decline in crop yield, a scarcity in water resources and severe weather patterns have profound effects on planning and harvesting patterns. Immediate and comprehensive action is needed, ignoring to take action has profound negative consequences not only for our environment but also for the economies, food security, and livelihoods of millions around the globe. The horrifying effect of climate change on human security jeopardizes the well-being of the current and future generations. Mitigation and adaptation strategies are needed

[2] "Arora, Naveen Kumar. "Impact of climate change on agriculture production and its sustainable solutions." *Environmental Sustainability* 2, no. 2 (2019): 95-96".
[3] "Ani, Kelechi Johnmary, Vincent Okwudiba Anyika, and Emmanuel Mutambara. "The impact of climate change on food and human security in Nigeria." *International Journal of Climate Change Strategies and Management* 14, no. 2 (2021): 148-167".

to address the negative effects of climate change on human security and ensure a prosperous future for all of us and generations to come[4].

The Earth's climate is varying as a result of the average global temperature rise (predicted at 1.1°C in 2022), and a climate emergency has been declared. Extreme heat, flooding, bushfires, droughts, and many other adverse effects of climate change have corresponding economic and societal repercussions. In the upcoming decades, there is expected to be additional warming, and the effects of this warming could be greater than society and ecosystems can handle or adapt to in a 1.5^{o}C or 2 °C temperature increase world. As a result, quick mechanisms are required to combat climate change hence preventing permanent harm to the environment [5].

The impacts of the global climate crisis are a result of anthropogenic activities, which culminate in greenhouse gas emissions. From the scientific evidence's assertion, climate change results from excessive emission of greenhouse gases such as methane, carbon dioxide, chlorofluorocarbons, and fluorinated into the atmosphere. These gases normally accumulate in the atmosphere and interfere with the Ozone Layer. The interference with this layer has triggered atmospheric changes, leading to the climate change menace.[6] Enormous literature has established inherent interlinks between the two concepts. It has been largely demonstrated in the policy-

[4] "Ferris, Elizabeth, and Sanjula Weerasinghe. "Promoting human security: Planned relocation as a protection tool in a time of climate change." *Journal on Migration and Human Security* 8, no. 2 (2020): 134-149".
[5] "McDonald, Matt. "Climate change and security: towards ecological security?" *International Theory* 10, no. 2 (2018): 153-180".
[6] "Scheffran, Jürgen, Michael Brzoska, & Janpeter Kominek. Climate Change, Human Security, and Violent Conflict. 2012".

oriented works that have denoted the negative impacts of climate change as a potential threat to security[7].

The widely held assertion remains that climate change is not only externally dominant in its cause but also exposes existential threats inherent in modern societies. Climate Change is considered a profound security hazard that debilitates the state's coping capacity with extreme weather patterns, droughts, floods, and environmental pollution, among others. The profound impacts of climate change, like extreme weather patterns, severe droughts, and even floods, continue to threaten millions of people globally as they constrain food production; thus, food insecurity jeopardizes human security.[8] In a nutshell, the connection between climate change and human security is established when their impacts transcend the threat of human survival, which the paper will seek to explore.

Climate change is interrelated with many other challenges such as urbanization, population increase, and economic growth, and has contributed to the unsustainable development being witnessed currently.[9] The United Nations came up with 17 Global Goals in 2015 popularly known as the Sustainable Development Goals (SDGs). The main objective was geared towards eliminating poverty, safeguarding the planet, and assuring peace and prosperity to all people by 2030. Goal 13 on Climate Action emphasizes the need for a prompt response towards combatting climate change and its impacts to enhance sustainability. Moreover, it raises awareness among

[7] "Ogele, Eziho Promise. "Climate change and human security in Rivers State, Nigeria." *International Journal of Advance Research and Innovative Ideas in Education (IJARIIE)* 6, no. 2 (2020): 2010-2019".
[8] "Chilunjika, Agatha, and Nkanyiso Gumede. Climate Change and Human Security in Sub-Saharan Africa. 2021".
[9] "Langridge, Joseph, Romain Sordello, and Yorick Reyjol. "Existing evidence on the outcomes of wildlife translocations in protected areas: a systematic map." *Environmental Evidence* 10 (2021): 1-31".

citizens through education as well as the capacity to build individuals and institutions towards climate change mitigation and adaptation mechanisms.[10] This clearly shows that there is a close tie between the environment and human security.

According, to a study done by Baldwin[11], millions of people will die by the end of the twenty-first century from calamities like intense floods, heat waves, droughts, famine, migration, and displacement, and above one billion people are projected to evacuate their homes. Climate change, along with other various environmental issues, could threaten the ability of many emerging and impoverished countries to meet the fundamental necessities of their populations. There is concern that these harmful effects of climate change could, under some conditions, intensify violent cycles and pose significant threats to human security.

The major threat to sustainable development in the world is climate change. About 90% of all-natural disasters happening on earth are as a result of adverse weather and extreme events of climate. In Kenya, Climate change and variability are evident in the declining rainfall amounts and an increase in average temperatures that are partly associated with the browning of Kenya's rangeland vegetation. An increased rate of drought has been experienced since there has been a decrease in both the long and short rainy periods.

Several aspects such as human wellbeing, ecological services, tourism, and wildlife niche, majorly depend on Kenya's environment. It is also where many of the effects of climate change

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[10] « He, Bao-Jie, Ayyoob Sharifi, Chi Feng, Jun Yang, Deo Prasad, Joni Jupesta, and Gloria Pignatta. "Climate Emergency, Actions and Environmental Sustainability." In *Climate Change and Environmental Sustainability*, pp. 1-6. Cham: Springer International Publishing, 2022".

[11] "Baldwin, Andrew. *The Other of Climate Change: Racial Futurism, Migration, Humanism*. Rowman & Littlefield, 2022".

are first felt, frequently as a consequence of changes in resource availability, the prevalence and severity of disasters, or the crucial functions that ecosystems play[12]. Ecosystems and wildlife across the nation are at risk from the widespread climate changes, which have cascading economic and social repercussions. Climate change poses real threats to communities bordering protected areas such as the Tsavo Conservation Area, which is a source of ecosystem goods and services that the communities rely on. Strategies for mitigating and adapting to climate change have to be explored and implemented to ensure environmental conservation in the protected areas[13].

1.2 Statement of the Research Problem

Climate change poses serious threats to the attainment of Kenya's sustainable development goals. With a population of 48.5 million people, Kenya is the largest economy in the East African region and serves as a financial hub, transport, and trade center[14]. However, the country's over-reliance on rain-fed agriculture and tourism is highly vulnerable to climate variability and extreme weather conditions. Seasonal variability and declining rainfall during the main rainy seasons have adversely affected food production as a result of climate change. Kenya has had an average temperature rise of 0.34°C in every decade between 1985 and 2015[15]. By

[12] "Chepkoech, Winifred, Nancy W. Mungai, Silke Stöber, and Hermann Lotze-Campen. "Understanding adaptive capacity of smallholder African indigenous vegetable farmers to climate change in Kenya." *Climate Risk Management* 27 (2020): 100204".

[13] "Los, Sietse O., F. Alayne Street-Perrott, Neil J. Loader, Cynthia A. Froyd, Aida Cuní-Sanchez, and Robert A. Marchant. "Sensitivity of a tropical montane cloud forest to climate change, present, past and future: Mt. Marsabit, N. Kenya." *Quaternary Science Reviews* 218 (2019): 34-48".

[14] "Nyika, Joan Mwihaki. "Climate change situation in Kenya and measures towards adaptive management in the water sector." In *Research anthology on environmental and societal impacts of climate change*, pp. 1857-1872. IGI Global, 2022".

[15] "Un. Policy Brief Climate Security in Kenya Local Mechanisms in Addressing Climate Related Security Risks.2022"

2050 average temperatures are projected to rise by between 1.2°C and 2.2°C, and drought severity is also projected to be more intense.

The 2008-2011 draught witnessed in Kenya alone resulted in a loss of $12.1 billion from severe crop and livestock losses. The coastal region of Kenya which is low -lying, makes it susceptible to sea level rise. Projections also reveal that climate variability could result in losses of up to 2.6% of Kenya's GDP by 2030, which could have severe negative effects on the economy stability development. Between 1932 and 2001, Mombasa city has recorded a rise in the sea level by 5.8 cm. A rise of the sea level is projected to rise by between 16cm and 42cm which could threaten more than 37% of coastal people[16]. Tsavo Conservation Area (TCA) faces periodical drought leading to water and forage scarcity, and anthropogenic wildfires among others. Environmental vulnerability normally comes from political, economic, social, and cultural processes. The Water and forage shortage affect livestock and wildlife alike. Conflicts relating to grazing in the protected area are common and the Government through Kenya Wildlife Service uses a lot of revenue in controlling livestock invasion.

The alarming statistics have alarmed policy makers and academicians to offer urgent interventions through studies and research. In particular, a study by Chilunjika on climate change and human security in Kenya provides an understanding of the intricate relationship between the two variables[17]. [18]Obwocha's on the other hand, study was on climate change and food security

[16] "Odhengo, Peter, Joanes Atela, Paul Steele, Victor Orindi, and Fiona Imbali. "Climate finance in Kenya: review and future outlook." *Climate Finance Policy Brief* 1 (2019)".
[17] "Chilunjika, A., and N. Gumede. "Climate change and human security in Sub-Saharan Africa." *African Renaissance* 2021, no. si1 (2021): 13-37".

in West Pokot and offers valuable insights while Kogo's study was on climate change, food production, and food security in Kenya[19].

These studies are more general and lack specification within Local contexts because Kenya is broad and ecological characteristics also vary which limits the generalizability of studies. The present study was conducted at the Tsavo conservancy area to offer a more focused study which allows for a more context-specific analysis of climate change and human security. The highlighted study in particular the study by Obwocha does not capture recent developments. In addition, the scholar study within West Pokot cannot be generalized which highlights the need for studies in another area. The studies are also mainly focused on one human security aspect, food security whereas there are other multiple human security aspects, clean water, health, and water that were covered by the study.

1.3 Study Objectives

1.3.1 Research Questions

This study seeks to answer the following questions:

i. What is the climate change profile in Tsavo Conservation Area, Kenya?

ii. What are the human security concerns in Tsavo Conservation Area, Kenya?

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[18] "Obwocha, Everlyne B., Joshua J. Ramisch, Lalisa Duguma, and Levi Orero. "The relationship between climate change, variability, and food security: understanding the impacts and building resilient food systems in west pokot county, Kenya." *Sustainability* 14, no. 2 (2022): 765".

[19] "Kogo, Benjamin Kipkemboi, Lalit Kumar, and Richard Koech. "Climate change and variability in Kenya: a review of impacts on agriculture and food security." *Environment, Development and Sustainability* 23 (2021): 23-43."

iii. What is the nexus between climate and human security in Tsavo Conservation Area, Kenya?

1.3.2 General Objective

The general objective of this study will be to determine the influence of climate change on human security in the Tsavo Conservation Area in Kenya.

1.3.3 Specific Objectives

Specifically, the study will seek:

i. To establish the climate change profile in Tsavo Conservation Area, Kenya

ii. To investigate human security concerns in Tsavo Conservation Area, Kenya.

iii. To determine the nexus between climate change and human security in Tsavo Conservation Area, Kenya

1.4 Theoretical Literature Review

1.4.1 Social Conflict Theory

The social conflicts theory was first introduced by Karl Marx in 1848 and later developed by Max Weber, and Ralf Dahrendorf. The social conflict theory's main focus is on the role of power, inequality, and conflicts in societies. According to Marx, there exists a class struggle where societies are divided into two, the owners of means of production who are capitalists, and

the second group who have the workers, according to the theory the class struggle between the two groups is the driving force for change and revolution[20].

The theory argues that there exists inherent inequality, where the owners of means of production who are also capitalists exploit the workers at the expense of maximizing their profits, the economic inequality extends to other contexts including, race, ethnicity, and gender[21]. The theory emphasizes the existence of unequal distribution and control where the people in power and ones closely connected to powerful figures in society exploit the marginalized groups. Often, clashes and conflicts arise when the oppressed become aware of the unfairness and exploitation and resist overcoming through protests, and strikes that result in social transformations[22].

However, the social conflict theory is not without criticism, because first, it overemphasizes conflicts and therefore undermines the aspects of cooperation, mutual agreements, consensus, and harmony in societies[23]. The theory is also viewed by critics as being oversimplified, while society is much more complex and is associated with culture, the role of institutions in governance, and individual agencies. The theory is also criticized for being too deterministic when the theory argues that conflicts and inequalities are inevitable and society must follow the path towards revolution to attain equality or balance. Finally, the theory is

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[20] "Von Uexkull, Nina, and Halvard Buhaug. "Security implications of climate change: A decade of scientific progress." *Journal of Peace Research* 58, no. 1 (2021): 3-17".

[21] "Andersen-Rodgers, David, and Kerry F. Crawford. *Human security: Theory and action*. Rowman & Littlefield, 2022".

[22] "Mach, Katharine J., Caroline M. Kraan, W. Neil Adger, Halvard Buhaug, Marshall Burke, James D. Fearon, Christopher B. Field et al. "Climate as a risk factor for armed conflict." *Nature* 571, no. 7764 (2019): 193-197".

[23] "Seddon, Nathalie, Alison Smith, Pete Smith, Isabel Key, Alexandre Chausson, Cécile Girardin, Jo House, Shilpi Srivastava, and Beth Turner. "Getting the message right on nature-based solutions to climate change." *Global change biology* 27, no. 8 (2021): 1518-1546".

criticized for being too diagnostic rather than offering practical solutions to inequalities and conflicts[24].

The social conflict theory is relevant in explaining the relationship between climate change and human security[25]. Climate change can result in resource scarcity such as arable farms and water which can exacerbate power and social inequalities. The theory focuses on resource equal distribution and conflicts over depletion of resources align with the challenges that are brought about by climate changes on human security. The theory also highlights the aspects of the marginalized being exploited by ones with power or ones who have more resources. During the climate change crisis, human beings become climate refugees, and displaced individuals might become victims of exploitation and exploitation, which emphasizes the theory's arguments on power dynamics.

Marginalized communities bear the brunt of environmental degradation resulting from climate change with the political economy deciding on how resources will be shared, such as disaster relief (food, clothing nod water). Finally, the theory emphasizes collectivism as a way of revolution where marginalized groups team up to demand their equitable share which results in human conflicts as they push for a share of the resources.

1.4.1 Human Security Theory

The human security theory was first introduced in 1996 by Amartya Sen and developed by other scholars including, Martha Nussbaum, and Mahbub ul Haq. Human security theory was

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[24] "Crandon, Tara J., James G. Scott, Fiona J. Charlson, and Hannah J. Thomas. "A social–ecological perspective on climate anxiety in children and adolescents." *Nature Climate Change* 12, no. 2 (2022): 123-131".
[25] "Simpson, Nicholas P., Katharine J. Mach, Andrew Constable, Jeremy Hess, Ryan Hogarth, Mark Howden, Judy Lawrence et al. "A framework for complex climate change risk assessment." *One Earth* 4, no. 4 (2021): 489-501".

introduced to overcome the challenges of the traditional security paradigms. The key argument of the human security theory is that human security should not be viewed solely on military terms but integrate various mechanisms to address human security threats from the economic, environmental, hardships, political, and health aspects[26].

According to the human security theory, human security should be broad enough to address the human well-being of hunger, diseases, political violence, and environmental degradation. The theory also is individual-centered, keenly focusing on individual security and society security as paramount to the state's security and interests[27]. The human security theory is multi-dimensional, meaning it is interconnected in such a case that one security threat like poverty can lead to food insecurity which can intern lead to conflicts and people displacement. The human security theory advocates for preventive and intervention mechanisms to address security issues through education, poverty eradication, health care services, and end environmental conservation to address future threats. Human security theory advocates for internal cooperation and responsibilities in addressing human security through borderless support to vulnerable populations[28].

Human security theory is not without criticism, because some critics argue that the theory lacks clarity in its acceptance universally making it hard to put into practice and operationalize[29].

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[26] "Seiyefa, Ebimboere. "How climate change impacts on regional security in West Africa: Exploring the link to organised crime." *African Security Review* 28, no. 3-4 (2019): 159-171".
[27] "Von Uexkull, Nina, and Halvard Buhaug. "Security implications of climate change: A decade of scientific progress." *Journal of Peace Research* 58, no. 1 (2021): 3-17".
[28] "Everard, Mark, Paul Johnston, David Santillo, and Chad Staddon. "The role of ecosystems in mitigation and management of Covid-19 and other zoonoses." *Environmental science & policy* 111 (2020): 7-17".
[29] "Ndawana, Enock. "When militarisation endangered both human and state security: The Zimbabwean experience, 2000–2008." *African Security Review* 29, no. 3 (2020): 242-266".

Another, argument against the human security theory is that it can jeopardize nations' sovereignty resulting in conflicts between intergovernmental and government conflicts, as a result of its principle or borderless interventions during severe human security issues. Lastly, critics argue that the human conflict dose not have a broader perspective and is only a reflection of the western values which does not apply in the non-western world[30].

Human security theory is relevant in the explanation of the phenomenon of climate change and human security[31]. Fists, climate change presents environmental challenges such as sea levels, extreme weather patterns, and resource scarcity which can threaten the human livelihood in marginalized areas. In addition, climate change can result in food and water insecurities where climatic changes disrupt food production and access to water which can ultimately result in malnutrition and hunger which are key elements of human security. Huma displacement or, "climate refugees" is also a growing concern that results from environmental degradation. Finally, climate change is a conflict catalyst or amplifier that can worsen resource tensions and undermine human security.

1.5 Literature Review

This section will review previous work on the drivers of climate change, human security concerns, the nexus between climate change and human security, and climate change mitigation and adaptation strategies that enhance human security.

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[30] "Schipper, E. Lisa F. "Maladaptation: when adaptation to climate change goes very wrong." *One Earth* 3, no. 4 (2020): 409-414".

[31] "Nightingale, Andrea Joslyn, Siri Eriksen, Marcus Taylor, Timothy Forsyth, Mark Pelling, Andrew Newsham, Emily Boyd et al. "Beyond technical fixes: Climate solutions and the great derangement." *Climate and Development* 12, no. 4 (2020): 343-352".

1.5.1 Climate Change Profile in Kenya

There are different causes of climate change in Kenya, which have been realized in the past few years. In the past, climate change was related to drought and famine. At the beginning of 2017, Kenya experienced high temperatures and low rainfall. This condition was estimated to emerge in 2016. According to the reports from the Kenya food security steering group (KFSSG), 2.6 million Kenyans needed food support in January, which rose to 3 million by March 2017[32]. Some of the causes of climate change that affect Kenyan human security are power sources, manufacturing industries, deforestation, use of transportation, production of foods by mechanization, burning of buildings, and consumption. Suppose such things are controlled, such as in transportation, replacing fuel vehicles with electric ones. There will be a reduction in the production of carbon (IV) oxide and carbon monoxide in the atmosphere that clouds the Earth and causes global warming. The following discussion will examine the drivers and outcomes of climate change on human security and the nexus between them in Kenya.

Fossil fuels

Fossil fuels' production of electricity and power is one major cause of climate change. When electricity and power are being produced by fossil fuels, a large chunk of carbon IV oxide and carbon monoxide is exposed to the atmosphere, which later causes global warming. In Sub-Saharan Africa, countries such as Kenya, South Africa, and Ghana, fossil fuel was recognized as a source of energy regardless of its negative effect on the climate, which is a threat to people. In controlling the consumption of such fuel in the three countries, there are policies implemented to

[32] "Ndiritu, S. Wagura. "Drought responses and adaptation strategies to climate change by pastoralists in the semi-arid area, Laikipia County, Kenya." *Mitigation and Adaptation Strategies for Global Change* 26 (2021): 1-18".

reduce GHG emissions. A case study of sub-Saharan Africa revealed that urbanization and income increase led to increased fossil fuel consumption for all mentioned countries.[33] Despite Kenya and South Africa's trade policies reducing fossil-fuel consumption, Ghana is found on the opposite side, which is why it is still practicing more or excessive fuel consumption. Moreover, the efficiency of the service sector decreased the use of such energy sources in the countries above. According to the study, it is evident that efforts are required to strengthen the energy efficiency system the countries depend on to reduce fossil fuel consumption, which leads to further climate change that eventually causes human security threats.

Industrialization

Another cause of climate change is industrialization. Africa has experienced tremendous climate change, which has intensified in the previous centuries mainly due to changes effected by the settler governments which caused urbanization. This is vividly explained by population increment, improvement of infrastructure, and improved systems in healthcare sectors.[34] Africa is being painted as the continent that will suffer most from the effects of climate change as a result of inadequate resources. The condition has intensified in the last fifty years because of the greenhouse effect caused by industrialization and heavy pollution. The major cause of pollution in urban areas in Kenya is mostly industries. In densely populated areas like Nairobi, pollution seems more prevalent than in rural areas, where industries are not as many as in urban areas. Therefore, human security in Kenya is threatened due to such conditions. There are many slum

[33] "Kwakwa, Paul Adjei, George Adu, and Anthony Kofi Osei-Fosu. "A time series analysis of fossil fuel consumption in Sub-Saharan Africa: evidence from Ghana, Kenya and South Africa." *International Journal of Sustainable Energy Planning and Management* 17 (2018): 31-44".

[34] "Matata, Andy Cons, and Ali Adan. "Causes of climate change and its impact in the multi sectoral areas in Africa-Need for enhenced adaptation policies." (2018)".

settlements in Kenya where pollution is at its extensive points in time. And it is a matter that needs to be considered to save the human race in Kenya.

More negative effects were realized in Kenya due to climatic change. More than 700 people, comprising approximately 48 pregnant women and 620 children plus lactating mothers, were stranded at Isiolo county villages in the event of heavy rain that cut off roads in May 2016.[35] These people faced life threats from disease and starvation because they could not access health care and food. The issue was not in consideration as it is a semi-arid area in Kenya that is usually dry in May. It is therefore evident that there was no preparation for such a condition by the administration of the government that ruled at that specific time because climate change led to misjudgment.

Kenya was recorded to be highly industrialized and polluted, leading to global warming, as a report indicates from KFSSG. Industrialization is the greatest cause of pollution, especially in urban areas. Policies like green finance or green economy are encouraged by all investors in different areas of the globe for environmental management and conservation. According to the intergovernmental panel on climate change (IPCC), human security can be addressed by an equal supply of fresh water and food. The government should supply these resources to the most affected areas within the country. Natural catastrophes like droughts and famine threaten humanity. Therefore, the government should take responsibility for its people and create a system that conserves the environment by controlling greenhouse emissions, especially from industries, and avoiding pollution through trade policies practiced by East African countries.

[35] "Ibid, (2018)."

Transportation

Transportation is another greenhouse emission Factor. Using vehicles that utilize fossil fuels emits carbon IV oxide into the atmosphere. Attributed to the increase of vehicles in the urban and countryside areas, there are high chances of air pollution through Co2 emissions. Therefore, human security in Kenya is a critical Factor in such a case. When the number of motor vehicles increases, then pollution increases. Global warming has eventually hit the country. The high-temperature rise today cannot be compared to twenty years ago. The reason is the high carbon IV oxide emission level in the atmosphere today. 2019 is recorded to be the hottest year in the world. High temperatures cause the melting of polar ice, decreasing the sea ice, and raising the sea level.[36] It brings devastating conditions to the coastal regions. Kenya has not yet reached a level where flood comes from the ocean to the nearby towns of the coastal region communities. Climate conservation is essential to curb such events.

Agricultural Practices

Human activities seem to cause climatic changes as well as ecological changes. For example, around the region of Lake Victoria, there is an increase in the population and agricultural practices inviting threats that lead to the Extinction of various species.[37] Fish is important for human consumption around the region but is endangered. Climate change causes food production to reduce. Therefore, it causes an alarm that even that which is in the lake that can be served as food is also under threat from human activities. Despite the climatic change, the

[36] "Arroyo, Vicki. "Critical Issues in Transportation 2019: Climate Change Resilience. (2019)".
[37] "Ngodhe, Steve Omari. "A review on Causes of Ecological change along Lake Victoria basin, Kenya." *Scientific Reports in Life Sciences* 2, no. 4 (2021): 30-39".

activities carried out by people around the lake endanger the fish species in the water, serving them as food. The Urban population at Kisumu is high, which means high pollution from the population living around that area. Eventually, it leads to environmental pollution, which affects the atmosphere and causes climate change. Rivers that serve Lake Victoria are contaminated, affecting even the freshwater that could be used for consumption. The government should form sanctions to control the lakeside.

Change in Climate has resulted in the undermining of the livelihoods of the people, and this has affected the overall output. The survival of the people solemnly relies on climatic conditions for the support of their daily activities. Land, which is the natural capital where human capital is labor within the farms, is affected by the change in the climate. The weather patterns tend to result in the development of drought, which affects the supply of food items to the people, thereby promoting the use of national parks in various countries for purposes of farming[38].

The growing population has established more land that was used for farming for settlement, and this has lowered the land that could be used to support livelihood. As a result of the rising population, more land has been established for cultivation, and this has caused a change in climate due to the reduction of the forest and tree cover that play a major role in establishing equilibrium in the ecosystem. The process of gaseous exchange has been affected, and the precipitation process has also lowered, and this has affected the flow of food to support

[38] "Shiroishi, Yoshihiro, Kunio Uchiyama, and Norihiro Suzuki. "Society 5.0: For human security and well-being." *Computer* 51, no. 7 (2018): 91-95".

of health and growth of human beings. Therefore, good health, which is part of human security, has been established to be under threat[39].

1.5.2 Human Security Concerns

Human security emerged as an antithesis of the traditional security approach that mainly focused on state survival in the global system. As an approach to security studies, it focuses primarily on the security of an individual in a societal set-up. Human Security encompasses the entitlement and the feeling of being secure with much emphasis on human rights and development. It avers that the security of an individual must include several prerequisite components, including health; food; economic; personal, political; environmental, and community securities. Given its failure to offer an exhaustive definition, it has been largely criticized for impeding the formulation of policies to better human security. Again, given its complexity, it has been questioned whether it fully underscores the security of individuals. To overcome these, among other criticisms, it has attempted to pursue a holistic path incorporating the means of achieving both negative and positive peace at all levels[40].

Globalism is slowly gaining much popularity and establishment in various aspects of life, and this has resulted in the realization of the idea of Human Security. Scholte is a popular scholar who conducted a clear analysis of Human Security and its impacts; the findings revealed some direct relations between the materials and the ideal of Human Security. It is crucial to recognize that the issues relating to human security were never a priority before the realization of

[39] "Kithiia, Justus, and Robyn Dowling. "An integrated city-level planning process to address the impacts of climate change in Kenya: The case of Mombasa." *Cities* 27, no. 6 (2010): 466-475".
[40] "Schilling, Janpeter, Almut Schilling-Vacaflor, Riccarda Flemmer, and Rebecca Froese. "A political ecology perspective on resource extraction and human security in Kenya, Bolivia and Peru." *The Extractive Industries and Society* 8, no. 4 (2021): 100826".

globalism. Majorly, Human Security is directly linked to the political theories that control the universe, where the overall goal is an enhancement for survival through the sufficient flow of resources. The concept of Human Security revolves around health, food, economy, and environmental safety. The issues within Human security are interdependent and are useful in the enhancement of survival [41].

In the quest to evaluate the aspects of human security within the current cases, there is much need to consider the development and evolution of human beings and how population, natural resources, energy, and pollution have affected the social and personal stability of the globe. The issues listed above are interrelated, and this results in a change in the issues that affect the quality of life for individuals and society. Through the impacts on the collective and the individual lifestyle, the political and economic choices are also influenced to ensure that they favor specific groups at the expense of exploiting others[42].

The analysis and evaluation of the Human Security Concept have resulted in the realization of the role of the collective good. The use of collective good helps the society in realizing shared benefits which are useful in the process of outshining the competing factors. Collective good is also established as a theory that mainly helps in the realization of the impacts of environmental changes and their problems and how they can be solved[43]. Additionally, sustainability is another concept within Human Security that is useful due to its ability to ensure that there is a proper evaluation of the economic and scientific perspectives realized for the

[41] "Kivisi, Felister Saliku. "Japan-Kenya Relationship, The Human Security Concept and Kenya's Big Four Agenda." *American Journal of Public Policy and Administration* 4, no. 1 (2019)".
[42] "Daoudy, Marwa. *The origins of the Syrian conflict: Climate change and human security*. Cambridge University Press, 2020".
[43] "Ibid, 2019".

collective good. Therefore, people are forced to focus on realizing the policies that are useful in establishing change and ensuring that society is rescued from consistent humiliation.

Wildlife conservation is part of the natural environment that tends to be protected by international agreements and treaties. The treaties and agreements are aimed at ensuring that there is peaceful coexistence between natural resources and human beings, where each section complements the existence of the other. Both human beings and wildlife are endangered species that require resources for the enhancement of protection and security. [44] Therefore, the agreements and treaties not only offer protection to human beings and wildlife but also ensure that natural habitats are free from pollution. The treaty is established to ensure that the nations can behave and prevent all the controversies that affect human rights, politics, and economic stability.

The global population has endured an increase, and this has affected the coexistence and interdependence between human beings and animals within the ecosystem. As a result, human security has been impacted by the growing population due to the increase in demand for some of the natural resources that have limited supply. It is also worth noting that the growing population of developing nations has placed the lives of its citizens at great risk of having their rights infringed at the expense of attaining economic and political freedom. Therefore, a shift in the balance of power is likely to be endured due to the rising population[45].

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[44] "Nyborg, Ingrid, Shweta Singh, and Gunhild Hoogensen Gjørv. "Re-thinking Violence, Every day and (In) Security: Feminist/Intersectional Interventions." *Journal of Human Security* 18, no. 2 (2022): 1-5".

[45] "Ani, Kelechi Johnmary, Vincent Okwudiba Anyika, and Emmanuel Mutambara. "The impact of climate change on food and human security in Nigeria." *International Journal of Climate Change Strategies and Management* 14, no. 2 (2021): 148-167".

Four key food security dimensions constrained by climate change include availability, stability, utilization, and accessibility. Climate change interferes with the availability of agricultural products by affecting crop yields, fertility, pests, and diseases. The increased temperatures, decrease in rainfall and unpredicted weather patterns in the Sahel and Sub-Sahara Africa, especially in Sudan, Mali, Niger, and Eritrea, which mainly rely on subsistence farming, have experienced severe threats to their livelihoods. In addition, excessive reliance on agriculture and lack of technical know-how, economics, and institutional-related mitigation and aptitude adaptation tend to expose most African countries to this menace. Access to food has also been hampered by climate change as a result of a decline in food production[46].

Most African countries have experienced increased food prices and a sharp decrease in purchasing power parity. With the continued floods and severe drought being experienced in some African countries as a result of climate variability, an increase in malnutrition and food insecurity remains inevitable. In Uganda, some reports have revealed that numerous people are already exposed to climate change and have become more vulnerable as they contend with securing stable food. The region's availability and accessibility to food have been linked to the negative effects of the climate change crisis on agriculture. It has hampered water security, which has threatened some people's survival in the region. For instance, in Tanzania, it was found that the water catchments around Mount Kilimanjaro have been threatened by severe

[46] "Berrang-Ford, Lea, A. R. Siders, Alexandra Lesnikowski, Alexandra Paige Fischer, Max W. Callaghan, Neal R. Haddaway, Katharine J. Mach et al. "A systematic global stocktake of evidence on human adaptation to climate change." *Nature Climate Change* 11, no. 11 (2021): 989-1000".

drought in the region, which in turn has affected food production and contributed to sporadic conflicts over water resources among the settlers in the region[47].

Additionally, the scarcity of natural resources has affected human security due to the legal and illegal struggle where people turn against each other towards the attainment of space to live. Therefore, constant fights pose some risks to stability and human security, as witnessed in the dry areas particularly the ASALs during the periods of cattle rustling. Due to the interrelation of human security and other facets of life, there is a need to focus on long-term solutions due to the less involvement of the international system and the state that affects national stability[48].

1.5.3 Climate Change and Human Security Nexus

Climate Change and Human Versus Wild Life Conflict

During the past few years, the world has evolved to be a very dangerous place that places the chances of survival of human beings at greater risk. Human-wildlife conflict is one of the major threats that has consistently affected the establishment and settlement of the people within various regions. Due to the rising population and establishment of more land for settlement and other economic activities, the natural habitats for the animals have been destroyed, and this has affected the overall survival of the animals. Most of the wild animals have reacted through their migration during the dry seasons to the nearby areas in search of food and water[49]. The process of moving from their initial areas of habitats has caused a direct crash with the people living near

[47] "Salih, Abubakr AM, Marta Baraibar, Kenneth Kemucie Mwangi, and Guleid Artan. "Climate change and locust outbreak in East Africa." *Nature Climate Change* 10, no. 7 (2020): 584-585".
[48] "Wainwright, Caroline M., Declan L. Finney, Mary Kilavi, Emily Black, and John H. Marsham. "Extreme rainfall in East Africa, October 2019–January 2020 and context under future climate change." *Weather* 76, no. 1 (2021): 26-31".
[49] "Ibid, 2020".

the national parks, and this has been a major threat to national security with rising cases of people being killed while others are injured.

The scarcity of resources and the growing population place human beings at risk of having their security interfered with. Therefore, the vulnerability of human beings to national security is linked to the low supply of resources, which tends to fail the support human survival, and this contributes to the vulnerability status. In the quest to promote people's ability to satisfy their urgent human needs, their security becomes a challenge due to the attacks by wild animals[50]. According to the Kenya Wildlife Services, snakes had been displaced from their natural habitats due to climatic variations, which affected the establishment of rodents and moles on which they feed. In the process of coping with harsh weather conditions, the snakes had to move to the surrounding areas where the rodents and the moles were in plenty due to maize farming. Therefore, human beings ended up being part of the prey, and their security was not guaranteed.

Changing and migrating from one region to the other in search of better land for grazing and farming has been the nature of human beings. Migration is mainly linked to the nature of human beings, where they have to keep moving to ensure that their needs are satisfied fully. The process of migration poses some vulnerability to threats to human security due to the slow encroachment on areas that are historically reserved for the grazing and habitats of wild animals. Communities carry out farming activities in areas bordering national parks, and this has directly

[50] "Cesarec, Ivana, Robert Mikac, and Davor Spevec. "The Concept of Human Security as a Basis for the Application of Big Data Concept in Establishment of Early Warning System for Crisis Management in the Republic of Croatia." *Croatian International Relations Review* 26, no. 86 (2020): 72-95".

interfered with the habitats of wild animals[51]. Wild animals have been reported to attack communities living adjacent to national parks and reserves, such as the Tsavo East National Park, where the elephants frequently visit the tomato farms. The attack by wild animals causes instability and destruction of property, where in some cases, even death can be witnessed when the animal is confronted, and the person confronting the animal is not properly armed[52].

Migration from the initial areas of settlement due to climate change has posed some challenges to the government in the process of providing security and protection to the citizens. Constant climatic changes have made most of the regions unbearable and affected the economic activities of the people prompting them to migrate to other regions that are perceived to be better for farming activities[53]. As a result, most farmers have relocated to the areas surrounding the national Reserve due to their virgin state, and this has in exchange resulted in the slow encroachment to prohibited zones. For instance, most of the tomato farms are situated around the Tsavo Conservation Area more specifically, Tsavo East National Park and Chyulu Hills National Park, and this has resulted in slowing encroachment into prohibited zones. Therefore, the government has found it hard in the process of providing sufficient security to the people due to the procedures used in the process of acquiring and allocating security personnel to guard

[51] "Okita-Ouma, Benson, Michael Koskei, Lydia Tiller, Fredrick Lala, Lucy King, Richard Moller, Rajan Amin, and Iain Douglas-Hamilton. "Effectiveness of wildlife underpasses and culverts in connecting elephant habitats: a case study of new railway through Kenya's Tsavo National Parks." *African Journal of Ecology* 59, no. 3 (2021): 624-640".

[52] "Lala, Fredrick, Patrick I. Chiyo, Erustus Kanga, Patrick Omondi, Shadrack Ngene, William J. Severud, Aaron W. Morris, and Joseph Bump. "Wildlife roadkill in the Tsavo Ecosystem, Kenya: identifying hotspots, potential drivers, and affected species." *Heliyon* 7, no. 3 (2021)".

[53] "Henschel, Philipp, Lisanne S. Petracca, Sam M. Ferreira, Steven Ekwanga, Steven Dennis Ryan, and Laurence G. Frank. "Census and distribution of large carnivores in the Tsavo national parks, a critical east African wildlife corridor." *African Journal of Ecology* 58, no. 3 (2020): 383-398".

specific areas. Additionally, the state is also faced with the challenge of provision of human security due to the frequent establishment of settlement areas[54].

Climate Change and Draught

Drought is a natural catastrophe that is usually linked to climate change. In different countries in Eastern Africa, Kenya, Uganda, and Ethiopia are highland areas. Therefore, there are low chances for droughts in such areas unless it is a semi-arid county where people live, like Isiolo County in Kenya. However, countries like Somalia, South Sudan, Sudan, and Tanzania are affected by drought. It is due to climatic changes in Africa today, and arid and semi-arid counties are mostly affected. Accelerated population growth in urban areas is why climate change has been so prevalent in eastern African countries. Moreover, such areas are in arid and semi-arid areas usually experience high levels of drought. Livestock, people, and plants suffer due to climate change. The governments of such countries might not have the capacity to control what they cannot tell or do not expect. Therefore, there is a need to remember climatic conservation policies.

Climate Change and Political Stability

Climate change has recently been related to the conflict. In various parts of Kenya, communities have fought over scarce resources such as fertile land for farming and pastoral land for livestock. The condition that occurs mainly due to climate change is presented as equivocal

[54] "Mseja, Gideon A., Alex W. Kisingo, Emanuel Stephan, and Emanuel H. Martin. "Dry season wildlife census in Mkomazi National Park, 2015." *Protected Areas in Northern Tanzania: Local Communities, Land Use Change, and Management Challenges* (2020): 133-143".

by IPCC.[55] Therefore, security becomes an issue due to inequality in the supply of important natural resources humans require. Resources such as freshwater and food are a necessity for human survival. The lack of such resources in some parts of Kenya triggers a mass population migration due to droughts and desertification. Because climate change is a global issue, the United States government report had to elevate an environmental challenge to the forefront of the security agenda by identifying climate change as a great potential issue to the security and global stability hence a national security factor[56].

Climate Change, Food, and Water Security

World food security is directly linked to climate change. In Kenya, just like in India, farmers have different perceptions of climate change, a serious factor that needs to be considered. For example, India is believed to face a high vulnerability to climate change. The livelihood of millions of families will eventually be negatively affected if climate change persists.[57] It might lead to a lack of freshwater and disease invasion, claiming many lives. Therefore, in Kenya, the commissions mandated with the responsibility of agriculture have researched smart agriculture so that Kenya can be in a better position to fight against climate change and its effects. When that happens, then food security will be guaranteed; otherwise, it will be disastrous.

[55] "Koubi, Vally. "Climate change and conflict." *Annual Review of Political Science* 22 (2019): 343-360".
[56] "Salih, Abubakr AM, Marta Baraibar, Kenneth Kemucie Mwangi, and Guleid Artan. "Climate change and locust outbreak in East Africa." *Nature Climate Change* 10, no. 7 (2020): 584-585".
[57] "Ansari, M. A., S. Joshi, and R. Raghuvanshi. "Understanding farmers perceptions about climate change: a study in a North Indian State." *Advances in Agriculture and Environmental Science* 1, no. 2 (2018): 85-89."

Climate change causes havoc, due to adverse outcomes of climate change, people from different communities within Kenya find themselves fighting and killing one another due to a lack of fresh water and food. These are important necessities of life, and human beings require these resources. Climatic change has exacerbated the existing social problems like injustice, poverty, violence, social insecurity, terrorism, and even civil war[58]. To overcome such vices in Kenyan communities, the government should play a role in controlling such events by providing food and fresh water in the affected regions. Different organizations like NGOs take responsibility for supporting the communities of the affected individuals from the adverse effects. People living in ASALs of Kenya face the consequences of this condition the most. The county governments need to form structures and policies and implement them to assist people from these regions to attain their livelihoods and live like any other Kenyan in the country[59].

Climate Change and Cultural Diversity

Culture and a sense of belonging assist people to uphold and tolerate cultural diversity. Climatic changes have affected the cultural practices of various groups that rely on cultural activities such as pastoralism as a means of livelihood.[60] Majorly, changes in the climatic conditions have resulted in a low amount of ground cover within the dry areas, and this has affected the livestock being reared in those regions. Due to the prolonged drought seasons within

[58] "Froese, Rebecca, and Janpeter Schilling. "The nexus of climate change, land use, and conflicts." *Current climate change reports* 5 (2019): 24-35".
[59] "Schilling, Janpeter, R. Locham, T. Weinzierl, J. Vivekananda, and Jürgen Scheffran. "The nexus of oil, conflict, and climate change vulnerability of pastoral communities in northwest Kenya." *Earth System Dynamics* 6, no. 2 (2015): 703-717".
[60] "Cattaneo, Cristina, Michel Beine, Christiane J. Fröhlich, Dominic Kniveton, Inmaculada Martinez-Zarzoso, Marina Mastrorillo, Katrin Millock, Etienne Piguet, and Benjamin Schraven. "Human migration in the era of climate change." *Review of Environmental Economics and Policy* (2019)".

the ASALs, the people dwelling in those regions have embraced a culture of cattle rustling to ensure that they can maintain huge herds of cattle despite the upcoming drought. The entire process of cattle rustling results in the death of herders of various communities during the attempt to defend their livestock. It is worth noting that some communities value livestock, and leadership positions are awarded to individuals with the largest herd of cattle. During the dry seasons, pastoralists drive their cattle in National Parks and Reserves, therefore, creating conflict and extensive use of Government resources to drive the livestock out of the protected areas.

Ani examined the evolving impact of climate change on food and human security in Nigeria[61]. The study was confined to various regions in Nigeria including, Abakaliki, Asaba, Barutin, Maiduguri, Gusau, and Markurdi. The study by Ani applied a case study approach, where both quantitative and qualitative data were used. Data on climate was obtained from secondary sources from reliable data bases and comprised main quantity data. Qualitative data on the other hand was obtained through unstructured interviewed conducted between January 2018 to November 2019 where a total of 48 semi-structured interviews were conducted on key informants from the different geopolitical zones. Besides, a total of six focused group discussions were organized comprising between five and seven participants from the six cities, Participants in the study were diverse and included, farmers, civil servants, NGOs, people from different ethnicities, and age groups. Data from interviews and focused group discussions were analyzed through content analysis.

[61] "Ani, Kelechi Johnmary, Vincent Okwudiba Anyika, and Emmanuel Mutambara. "The impact of climate change on food and human security in Nigeria." *International Journal of Climate Change Strategies and Management* 14, no. 2 (2022): 148-167".

Results revealed that climate change had resulted in food decline, indicating challenges in food production and availability. Additionally, climate change has resulted in armed conflicts related to competition for resources which eventually eroded human security in Nigeria. The results underscore an immediate need to address the impact of climate change in Nigeria. The results also call for proactive measures to mitigate climate-related challenges and conflicts, including an emphasis on sustainable resource use and management as well as adaptation mechanisms to enhance the well-being of community members in Nigeria.

Several scholars have recently done academic research to find out the wider ramifications of the change in climate on human security in the country. For instance, scholars like M'mboroki have vested in the effects of climate change on the individual conflict in Kenya. The findings established that the menace had severe implications for resource-based conflict[62]. It asserted that climate change can never be ruled out in the conflicts and tensions over natural resources witnessed in several regions of the country. However, the study was restricted to resource-based conflict and failed to incorporate other aspects of personal conflicts in Kenya.

A study by Shazia on the Mau Forest demonstrated that climate change has significantly culminated in the depreciation of natural resources that in turn has affected water security in agricultural practices in the country.[63] The sorry state of the Forest has impacted the water supply to trans-boundary water bodies and the depletion of underground water sources. Consequently, frequent floods caused by the Mara River in Narok County have also threatened livelihoods. It

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[62] "M'mboroki, Kiambi Gilbert, Shem Wandiga, and Silas Odongo Oriaso. "Climate change impacts detection in dry forested ecosystem as indicated by vegetation cover change in—Laikipia, of Kenya." *Environmental monitoring and assessment* 190 (2018): 1-19".

[63] "Chaudhry, Shazia. "Climate Change and Human Security in Africa: a Case Study of the Mau Forest Complex, 1963–2012." PhD diss., University of Nairobi, 2014".

showed environmental degradation was fuelling up the aging process and, by rendering people susceptible to different diseases, increasing food insecurity due to water scarcity. Additionally, the study showed that the dwindling glaciers on Mount Kenya and, subsequently, water reduction in the region had their origin in climate change. Rivers whose source is the mountain have dried. This affected livestock and agricultural, thereby jeopardizing the attainment of fundamental human needs.

Climate change's menace has also been found to threaten people's security in Kenya. More recently, a study by Makanga has established that an increase in climate change-related hazards is large enough to be blamed for increased food and water insecurities, especially in Arid and Semi-Arid Areas[64]. This study demonstrates the high vulnerability of pastoral communities to climate change because of excessive reliance on traditional free-range grazing systems. A study done in Turkana County also established that it is prone to climate-security-related threats. It is informed that the County is largely pastoral and susceptible to climate change hazards such as prolonged drought that affects their livestock. Additionally, the continued severe drought has also caused increased water insecurity, leading to stiff competition for the commodity. It, in turn, has often led to inter-communal conflicts and social tensions.

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[64] "Makanga, Cindy M. "The Impact of Environmental Factors on Human Security in Africa." PhD diss., University of Nairobi, 2019".

conflict[65]. It asserted that climate change can never be ruled out in the conflicts and tensions over natural resources witnessed in several regions of the country. However, the study was restricted to resource-based conflict and failed to incorporate other aspects of personal conflicts in Kenya. A study by Shazia on the Mau Forest demonstrated that climate change has significantly culminated in the depreciation of natural resources that in turn has affected water security in agricultural practices in the country[66]. The sorry state of the Forest has impacted the water supply to trans-boundary water bodies and the depletion of underground water sources. Consequently, frequent floods caused by the Mara River in Narok County have also threatened livelihoods. It showed environmental degradation was fuelling up the aging process and, by rendering people susceptible to different diseases, increasing food insecurity due to water scarcity. Additionally, the study showed that the dwindling glaciers on Mount Kenya and, subsequently, water reduction in the region had their origin in climate change. Rivers whose source is the mountain have dried. This affected livestock and agricultural, thereby jeopardizing the attainment of fundamental human needs.

The study focused on examining the effect of climate change on human security within the 21st-century international system, with a focus on Africa and in particular Kenya[67]. The study was guided by three main objectives, to examine the nexus between climate change and human security in the 21st century within the internal context, the nexus between human security

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[65] "M'mboroki, Kiambi Gilbert, Shem Wandiga, and Silas Odongo Oriaso. "Climate change impacts detection in dry forested ecosystem as indicated by vegetation cover change in—Laikipia, of Kenya." *Environmental monitoring and assessment* 190 (2018): 1-19".

[66] "Chaudhry, Shazia. "The impact of climate change on human security: the case of the mau forest complex." (2015): 390-398".

[67] "Chilunjika, A., and N. Gumede. "Climate change and human security in Sub-Saharan Africa." *African Renaissance* 2021, no. si1 (2021): 13-37".

and climate change within the African context, and finally an analysis of the effect of climate change on human security within Kenya. The study was descriptive and applied both primary and secondary sources of data. The target respondents were climate experts from the united nations, NGOs, and Kenya's meteorological departments. Mean, standard deviation, frequency and mean were used to analyze data.

Results revealed that at the global level, climate change posed risks from low levels of warming to high levels of warming. Climate change was also revealed to have a negative exacerbating effect on food security in Africa and disruptions of the ecosystems. Deforestation which is ongoing in most African countries has resulted in food insecurities, water scarcities, health crises, environmental degradation, and cultural disruptions. Similar effects were witnessed in Kenya where personal insecurities and food shortages were a result of climate change. The study implied the interconnectedness of climate change globally, in Africa and also in Kenya which calls for immediate address.

A study was conducted on the impact of climate change and food security in West Pokot, Kenya between 1980 and 2012[68]. The study applied both local and scientific approaches to understand the phenomenon. The study-specific objectives were, to characterize rainfall patterns between 1980 and 2011, to analyze vegetation cover in the area over the study period, to assess the land cover and usage between 1984 and 2010, and to survey locals' knowledge of climate change, and use decisions and food security. The study applied mixed research designs where

[68] "Obwocha, Everlyne B., Joshua J. Ramisch, Lalisa Duguma, and Levi Orero. "The relationship between climate change, variability, and food security: understanding the impacts and building resilient food systems in west pokot county, Kenya." *Sustainability* 14, no. 2 (2022): 765".

rainfall data from the meteorological department was analyzed to characterize the rainfall patterns, in addition remote sensing machine was applied to analyze the land use and land cover changes (LULCs). Lastly, a survey was conducted among 124 residents within west Pokot to collect local knowledge and perception on climate change and food security. The findings of the study revealed that 88% of respondents indicated a change in rainfall patterns, a decline in rainfall, and rising temperatures. The lowlands and highlands within the county revealed a rise in temperatures by +1.25 °C and +1.29 °C, respectively. In addition, results on land use and land cover noted an increase of 4176% in crop land as well as a decline in grass cover and forests by 49% and 38% respectively. Respondents revealed that their primary source of information on weather-related news was 64% who said radio whereas 26% indicated traditional weather forecasts. Results of the study implied variability in climate patters within west Pokot county which calls for immediate action to avail mitigation, sustainable, and adaptable measures. An increase in the cropland area and a decline in forestation areas indicated human encroachment on the wild areas which have the potential of causing wild-human conflicts. The study informs the importance of applying both local and scientific knowledge in providing sustainable solutions to food security.

Kogo explored climate change, crop production, and food security in Kenya. The study examines the current and future challenges posed by climate change on food availability and agriculture[69]. The study's specific objectives were to, assess the historical and current effects of

[69] "Kogo, Benjamin Kipkemboi, Lalit Kumar, and Richard Koech. "Climate change and variability in Kenya: a review of impacts on agriculture and food security." *Environment, Development and Sustainability* 23 (2021): 23-43."

climate change on food security, predict future effects of climate change on food production, identification of marginalized regions in Kenya, and propose adaptation and mitigation strategies for food security in the face of climate change. The study applied both scientific methods and primary data. applied climate modeling techniques and agricultural assessments through the use of historical data on climate, crop yield, and climate models in analyzing historical, current, and future climate aspects of temperature and precipitation. Primary data was collected from framers to understand their experience and the adaptation mechanisms. Results revealed that Kenya was already experiencing climate change which affected rainfall patterns, temperature rise, and agriculture that relied on rainfall.in addition, the study revealed that people living in semi-arid and arid areas were already being affected by low agricultural production from a decline in rainfall. From climate modeling analysis, results revealed that crop yield and patterns will continue to be affected if immediate action is not taken. The study implies that stakeholders and policy makers should urgently address the effects of climate change through mitigation and adaptation mechanisms. Adaptation should be tailored to specific regions and crops which ensures food security. The study serves as a valuable guide for policy makers, agricultural practitioners, and agencies involved in climate adaptation and food security planning in Kenya.

Another attempt was made by Kinoti. Using Mount Kenya region as the study area, he showed that climate change was inherently linked with the deterioration of individual security in the region through the acceleration of the aging process and the increment of the likelihood of individual exposition to different diseases. Moreover, the reduction of food production in the region was a result of water scarcity. The study further established that the decline of glaciers in Mount Kenya and its wider ramifications on the reduction of water flow had its roots in climate

change[70]. These consequences revealed the study has been a decline in the recharge of rivers which traces their sources to the mountain. Consequently, livestock and crop yields have been affected, thus threatening food accessibility and production. The study asserted that climate change implications were not limited to the studied regions but overlapped across the country.

1.5 Gaps in Literature

While the study by Ani provides important insight into the impact of climate change on food security in Nigeria, there are several gaps emanating from the study. First, the study was conducted in an area with different ecological, climatic, and socio-economic activities from that in the Tsavo conservation area in Kenya. Therefore, is it important to recognize these differences and conduct area-specific studies.

Chilunjika's study on climate change and human security within international and Kenyan contexts provides a foundation for the current study, however, the study provides a broader scope within Africa and Kenya, conducting a study within the Tsavo Conservancy area allows the scholar to conduct more localized and specific analysis therefore delving deeper into the climate risk profile and its relationship with human security concerns. The study by Chilunjika sought data from climate experts, international organizations, and government agencies however a study that focuses on conservationists, local communities, and administrators within Tsavo would help in providing more nuance insights that cannot be obtained from much broader studies. In addition, the study by Chilunjika only applied quantitative techniques in data analysis including,

[70] "Kinoti, Kibetu Dickson, Colbert Mutiso Jackson, and Mwangi Joyce Muthoni. "Dynamics of Climate Change Adaptations on Horticultural Land Use Practices around Mt. Kenya East Region." *Am. J. Environ. Prot* 7 (2018): 1-6".

standard deviation, mean, and frequencies. The application of both qualitative and quantitative techniques would aid in understanding the in-depth experiences and perceptions of human security within the Tsavo Conservancy area.

The study by Obwocha on the impacts of climate change and food security in west Pokot, between 1980 and 2012 provides valuable insights on local implications of climate change. However, certain gaps can be filled by conducting a study on the influence of Climate Change on Human Security in the Tsavo Conservation Area. Fists given a time frame of between 1980 and 2012, this time frame might not capture recent developments. Conducting a study in Tsavo provided more recent developments. West Pokot is just one area in Kenya with different ecological characteristics, therefore it is important to analyses different ecological zones to establish how results compare. The study also only focused on one aspect of human security, food while not considering other multiple aspects including clean water, safety, and health. The present study will comprise multiple aspects of human security to give it a holistic approach. In addition, the study did not delve into the socio-economic activities of the communities that have a bearing on haunt security. Lastly, the study lacked policy recommendations on mitigation and adaptability, The study within the Tsavo conservancy area provided practical policy recommendations for the stakeholders and the policy makers to address human security challenges in the Tsavo area.

Kogo, study on climate change, food production, and food security in Kenya is broader and lacks specification. Conducting a study within Tsavo provided specific context to analyze diverse ecosystems and human-wildlife interactions which Tsavo is known for.

Most studies link climate change with food security. This study aims to bridge the research gap by identifying climate change-related conflicts and how they impact human security with a special emphasis on Kenya's Protected Areas specifically the Tsavo Conservation Area. Therefore, conducting a study in Tsavo will provide comparable findings with the rest of the country. Besides the study by Kago is only focused on one item of human security which is food security. The present study focuses on multiple areas of food security including, clean water, health, shelter, and overall well-being of community members. Kao's study only focused on scientific methods and farmers while the present study considered local communities' and consumers ' perceptions of climate change and mechanisms undertaken to mitigate the challenges. Conducting a study within Tsavo also provides an avenue for comparing results with other parts of the country.

1.7 Justification of the Study

1.7.1 Academic Rationale

Climate change has a bearing on human security which has a bearing on Kenya's national interest, therefore, warranting further empirical investigation. The study can bridge the knowledge of how human security has been impacted by climate change. The study provides a reference point for intellectuals to augment the body of knowledge which can assist in theory building.

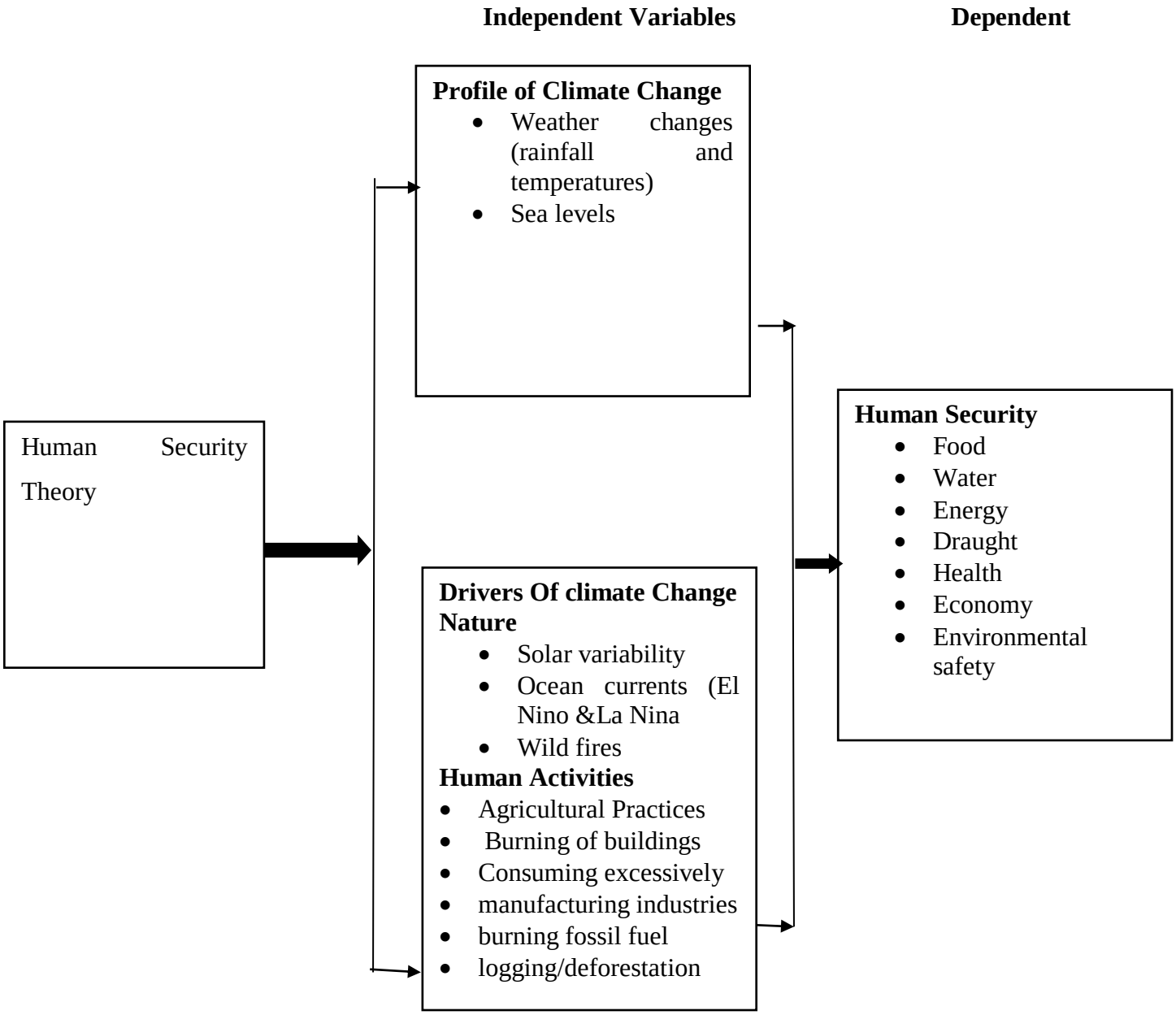
1.7.2 Policy Rationale

The findings of this study can aid in the implementation of national and sectoral climate change adaptation and mitigation policies to improve human security. This in turn can help to strengthen the wildlife sector in Kenya while contributing to global environmental sustainability through

climate action in Kenya.

1.8 Conceptual Framework on Climate Change and Human Security

Figure 1.1: Conceptual Framework



Source: Adapted From: "Kivisi, Felister Saliku 2019".

Human Security Theory will serve as the study's guiding theory. Human security provides an invaluable perspective for understanding and addressing the complex issues confronting people and communities in the twenty-first century, including global environmental change, making it the study's greatest fit. Human security is described as a state in which people and communities can respond to threats to their fundamental needs and rights so that they can live with dignity in The Global Environment Change and Human Report (2016). Human security includes three different kinds of freedoms: freedom from fear, freedom from wants, and freedom from indignity.

The idea of human security, according to the report, focuses on how various stressors, such as conflict, affect people and communities as well as their ability to react to dangers to their social, environmental, and human rights. Conflicts resulting from the effects of climate change on the ecosystem will be examined in this study. The human security theory emphasizes that, as opposed to being an impersonal scientific issue that can be separated from social processes, environmental change is a social problem with environmental aspects.

Using the human security theory as a conceptual framework, this study will examine how environmental change vulnerability is shaped by cultural, social, economic, and political systems. To learn how local communities in the Tsavo Conservation Area adapt to environmental changes and look for long-lasting solutions to the effects of climate change, this study will also interact with local communities there. Because of the capacity for individuals and organizations to challenge the systems and structures that lead to vulnerability in the first place, this will be achievable. Specifically, this entails reducing the causes of environmental change and addressing the socioeconomic causes of vulnerability.

1.9 Methodology of the Research

This section covers the procedures that were covered while conducting the case study research. Discussed here are the research design, target population, data collection procedure, data analysis, data analysis, data presentation, ethical considerations, and validity and reliability

1.9.1 Research Design

The overall approach adopted to assist in integrating various study components is known as research design. The measure of research designs varies in complexity. However, a sound design is expected to identify the research problem and justify why it has been selected. The research design should also review the previously researched literature associated with the research problem[71]. Thirdly, an influential research design should specify the hypothesis clearly and explicitly. This means that it can help collect data and carry out analysis and also vividly describe the methods of data used to manage the said information.

In this study, the researchers employed a case study design, utilizing a combination of online and on-the-ground enumerators. The enumerators, who were trained online by the researcher, administered questionnaires to communities living around the TCA (Targeted Case Area) and conducted interviews with key informants. The enumerators diligently entered the responses every evening, allowing the researcher to closely monitor all the activities and progress throughout the study.

[71] "Dannels, Sharon Anderson. "Research design." In *The reviewer's guide to quantitative methods in the social sciences*, pp. 402-416. Routledge, 2018".

The study employed a comprehensive approach, examining both the causes of and the impacts of climate change on human security. It delved into the underlying factors contributing to climate change and assessed how they interact with various dimensions of human security.

1.9.2 Study Site

The research study was conducted in Tsavo East National Park, Tsavo West National Park, and Chyulu National Park (Tsavo Conservation Area). It is also popularly known as the Tsavo Ecosystem. The Tsavo Conservation Area comprises an area of around 42,000 km^2. Over 25,000 km^2 of this area is protected. It is a world-renowned area where the largest population of elephants is found among the other big five wildlife. The activities carried around the place include tourism which creates job opportunities and diversifies sources of income for members of its community. However, this place faces many threats which include persistent Conflict between wildlife and humans among other environmental challenges.

1.9.3 Research Sample and Sampling Technique

Sample was selected from decision-makers at the Ministry of Tourism and Wildlife, the Kenya Wildlife Service, wildlife managers from the Tsavo Conservation Area (TCA), which includes the Tsavo East, Tsavo West, and Chyulu Hills National Parks, communities near the TCA, and managers of wildlife conservancies near the TCA.

There are 10 senior officials from the Ministry of Tourism and Wildlife. According to Mugenda and Mugenda (2003), 30% of a population is justifiable. In this case, therefore, 3 officials from the Ministry of Tourism and Wildlife were sampled.

There are 8 senior officials from KWS headquarters and 4 from KWS Tsavo. Kothari (2004) argues that 50% of a small population should be used as a sample. Therefore, 4

respondents from headquarters and 4 from TCA were selected purposively to take part in the study. There are 60 senior officials from Kenya Wildlife Research and Training Institute. Using 10% justification from Mugenda and Mugenda, 6 respondents were purposively selected.

Further, there are 90 opinion leaders in the community living adjacent to the Tsavo. The study utilized 10% of the population as justified by Kothari and Garg[72]. The population living adjacent to both Tsavo West and Tsavo East National Parks in addition to Chyulu Hills National Park is estimated to be 20,000. Considering the population size exceeding 10,000, the appropriate sample size was determined using Fisher's formula for sample size calculation. The formula is provided below.

$$n=\frac{z^2 pq}{d^2}$$

Where n=desired sample size (the target population is greater than 10,000).

z=the standard normal deviation at the confidence level of 95% is 1.96.

p=the proportion of the target population estimated to have characteristics being measured is set at 50%

q=1-p (probability of non-success)

d=level of statistical significance set at 0.05

$$n=\frac{(1.96)^2 * 0.5 * (1-0.5)}{(0.05)^2}$$

[72] "Rahman, Md Mizanur, Mosab I. Tabash, Aidin Salamzadeh, Selajdin Abduli, and Md Saidur Rahaman. "Sampling techniques (probability) for quantitative social science researchers: a conceptual guideline with examples." *Seeu Review* 17, no. 1 (2022): 42-51".

n=384

A sample sub-group with appropriate characteristics was picked from the target population. Policymakers from the Ministry of Tourism and Wildlife were purposely selected to give insight into policies and strategies related to this study. Senior Kenya Wildlife Service Officers from the headquarters and Tsavo Conservation Area were also selected. Communities next to Tsavo East National Park, Tsavo West National Park, and Chyulu Hills National Park were chosen using a simple random sampling method.

Table 1.1: Summary of population, sample size determination formula and sampling technique

S/N	Population Description	Target Population	Formula	Sample Size	Sampling Technique
1.	Ministry of Tourism and Wildlife	10	30% (Mugenda & Mugenda 2003)	3	probabilistic
2.	Kenya Wildlife Service (Headquarters)	8	50% (Kothari, 2004)	4	Probabilistic
3.	Kenya Wildlife Service (TCA)	8	50% (Kothari, 2004)	4	Probabilistic
4.	Kenya Wildlife Research and Training Institute	60	10%	6	Purposive
5.	Opinion leaders (TCA)	90	10%	9	Purposive
6.	Community Members living adjacent to TCA	20,000	Fisher's et al. (1999)	384	Simple random
	Total	**20,176**		**410**	

1.9.4 Data Collection Procedure

The data collection procedure is the process through which information is collected from the field. Data is usually collected using qualitative and quantitative means. Qualitative methods

are approaches that give descriptions and opinions in the form of narrations. Quantitative data refers to inferential or statistical data.

The study comprised both qualitative and quantitative methods. While conducting this research, both primary and secondary sources were used to obtain data. Semi-structured questionnaires and Focused Group and interview guides were used to collect data.

a) Primary Data

Semi-structured questionnaires were administered to the members of the community while the unstructured interviews were conducted among key informants from the Ministry of tourism and wildlife, Kenya Wildlife Service (headquarters), Kenya Wildlife Service (TCA), and Kenya Wildlife Research and Training Institute, which was crucial in crucial in in-depth data gathering by generated information, ideas and insights on particular subject matter[73].

Focus group discussions were carried out with members of the community living adjacent to the various protected areas in TCA.

b) Secondary Data

The study reviewed secondary data from existing literature in journal articles, books, case studies, policy documents, Government documents, conference papers, theses, dissertations, internet sources, and periodicals.

[73] "Jo, Eun Seo, and Timnit Gebru. "Lessons from archives: Strategies for collecting sociocultural data in machine learning." In *Proceedings of the 2020 conference on fairness, accountability, and transparency*, pp. 306-316. 2020".

1.9.5 Data Analysis and Presentation

Data analysis is the systematic evaluation of information collected during a study. The study used both qualitative and quantitative data analysis techniques[74]. The quantitative data from the questionnaires was cleaned, coded, and analyzed using Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistics were used in analyzing the data. The descriptive analysis was done by use of means, percentages, and frequencies.

Presentation is the way data from the field is visualized for easy interpretation. In this study, quantitative data was presented through graphs, charts, and frequency tables whereas qualitative data was presented through narratives in prose.

1.9.6 Data Collection Tools Piloting

In this study, data collection tools underwent peer review to ascertain that the tools are adequate in collecting the correct data that can address the objectives of the research. The reliability of the data collection tools was analyzed, and adjustments were made accordingly.

1.9.7 Ethical considerations

Ethical considerations in a study are a set of values that guide research study designs and practices. As required by the Council of University Education, the researcher obtained approval from the National Defence University-Kenya and NACOSTI. The purpose of the research was made very clear that it was for academics, participation was voluntary, and anonymity and confidentiality were observed.

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[74] "Kraus, Daniel. "Consolidated data analysis and presentation using an open-source add-in for the Microsoft Excel® spreadsheet software." *Medical Writing* 23, no. 1 (2014): 25-28".

1.9.8 Validity and Reliability

In research, validity, and reliability are important concepts as they help in evaluating the appropriateness of a study. Reliability refers to the consistency of the study tools and process of analysis. Reliability helps in making sure the results represent the real picture from the field. On the other hand, validity is about how accurate the method is. In this case, the instruments conformed to the study specification[75]. The study ensured the validity and reliability of the information collected.

1.10 Definition of Terms

Human Security: refers to safeguarding individuals from various forms of threat that encompasses which can emerge from physical, health, environmental, political, and economic concerns by ensuring people's dignity, well-being, and rights to enhance secure living conditions.

Climate Change: refers to long-term alternations in the temperatures, weather patterns, and environmental conditions that are primarily a result of human activities including the burning of fossil fuels, logging, and industrialization, therefore releasing greenhouse gasses into the atmosphere resulting in global warming and a shift in climate patterns. The effects can be drastic resulting in ecological disruptions, severe weather patterns, and rise in sea levels.

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[75] "Bull, Claudia, Joshua Byrnes, Ruvini Hettiarachchi, and Martin Downes. "A systematic review of the validity and reliability of patient-reported experience measures." *Health services research* 54, no. 5 (2019): 1023-1035".

Human Conflict: refers to clashes or disagreements that arise between groups of people (communities), or individuals as a result of having different interests or beliefs that are not mutually satisfied. Conflict can result from competition for resources and can manifest in various ways including, social tensions, armed confrontations, and verbal disputes. Resolving disputes can involve several ways including, negotiations, mediation, or communications as ways of intervention.

Draught: is a prolonged period with abnormally low precipitations which results in water scarcity, low agricultural productivity, adverse environmental impacts, and negative social economic effects.

Green House Effect: refers to a natural phenomenon when certain atmospheric gases including carbon dioxide and methane trap more heat than what is normal from the sun and maintain higher temperatures than normal heat, the rise of these temperatures is a result of human activities such as burning of fossil fuels.

Ozone layer: refers to a region of the earth Earth's stratosphere with a high concentration of ozone molecules and plays a significant role in blocking harmful ultraviolet radiation from the sun from harming living organisms on earth, its depletion can harm the environment and human health, excessive fossil ages emissions have been associated with depletion of the ozone layer.

Global Warming: refers to the increase in the earth's average temperatures as a result of the build-up of greenhouse gases such as carbon which comes from human activities of burning fossil fuels. The phenomenon is the main cause of climate change where sea level rises, severe weather patterns are witnessed as well as ecological and human disruptions.

1.11 Chapter Summary

Chapter one contains the introduction and background of the study on climate change and human security. The chapter provides a statement of the problem, general and specific objectives of the study, and research questions. The chapter also justifies the study, hypothesis, scope and limitations, and research methodology. Chapter Two examines the profile of climate change in the Tsavo Conservation Area. Chapter Three examines the human security concerns in the Tsavo Conservation Area. Chapter four determines the nexus between Climate Change and Human Security. Chapter five presented the summary of findings, conclusions, and policy and academic recommendations including areas for further research.

CHAPTER TWO

CLIMATE CHANGE PROFILE IN TSAVO CONSERVATION AREA

2.1 Introduction

This chapter presents the findings and discussions on climate change. The data is presented in charts, figures, tables, thematic narrations, and verbatim quotes. To comprehensively give a full discussion, this study heavily draws from the respondent data while linking the findings to previous studies. The discussions are objective-centered, and the sections outlined include the Bio-data of the respondents and climate profile risk in Tsavo Conservation Area, Kenya.

2.2 Response rate

Four hundred and ten (410) respondents participated in the study. 384 of 410 People responded to questionnaires, and 26 People were interviewed. This represents a 100% response rate for each of the categories. This high response rate is a positive outcome, as it suggests that all the respondents actively participated in the study and were willing to provide their perspectives and opinions.

Table 2.1: Response rate

S/N	Population Description	Sample Size	Response Rate (%)
1	Ministry of Tourism and Wildlife	3	100%
2	Kenya Wildlife Service (Headquarters)	4	100%
3	Kenya Wildlife Service (TCA)	4	100%
4	Kenya Wildlife Research and Training Institute	6	100%
5	Opinion leaders (TCA)	9	100%
6	Community Members living adjacent to TCA	384	100%
Total		**410**	**100 %**

The 100% response rate for each category may be attributed to the following factors i) clear and concise research design, which communicated the purpose and goals of the study to the participants, ii) use of purposive sampling that allowed for the selection of highly motivated and knowledgeable participants who were likely to be engaged and interested in the study. Additionally, the use of simple random sampling for one of the categories (Community Members living adjacent to TCA) allowed for a representative sample that accurately reflects the population, iii) the use of clear and concise communication with participants, including the explanation of the study's purpose and goals.

It is important to acknowledge any potential limitations or challenges that may have influenced the results, such as selection bias or the influence of social desirability. However, the combination of clear and concise research design, the use of purposive and random sampling techniques, and effective communication with participants suggest that the results are trustworthy and can provide valuable insights into the research topic.

The study data from the questionnaires are used for the quantitative analysis in this study which are represented in charts and tables. The interview data however will be thematically analyzed in a content review and used in the qualitative inferences for the study.

2.3 Reliability of the study instrument

Reliability is the degree to which a research instrument demonstrates consistency on repeat trials. The study used Cronbach's Alpha to determine the reliability of the

questionnaire. The Cronbach Alpha was determined for each objective. The Cronbach's alpha values were displayed below for the items themselves.

Table 2.2: Cronbach Alpha analysis of the questionnaire

Item-Total Statistics			
Objectives of the study	**Cronbach's Alpha**	**Number of items**	**status**
Climate change profile in TCA	0.867	5	Reliable
Human security in TCA	0.882	5	Reliable
Climate change and human security nexus	0.871	5	Reliable
Total Reliability	**0.873**	**15**	**Reliable**

Cronbach's Alpha value of 0.873 shows a high-reliability coefficient. According to Mugenda and Mugenda (2015) a Cronbach's value of above 0.7 shows that the questionnaire was dependable.

2.4 Bio data of the Respondents

The gender of the respondents, age of the respondents, level of education of the respondents, affiliation of the respondents, duration that respondents have worked in climate change sector/space, and main source of income for the respondents will be presented below.

2.4.1 Gender of the Respondents

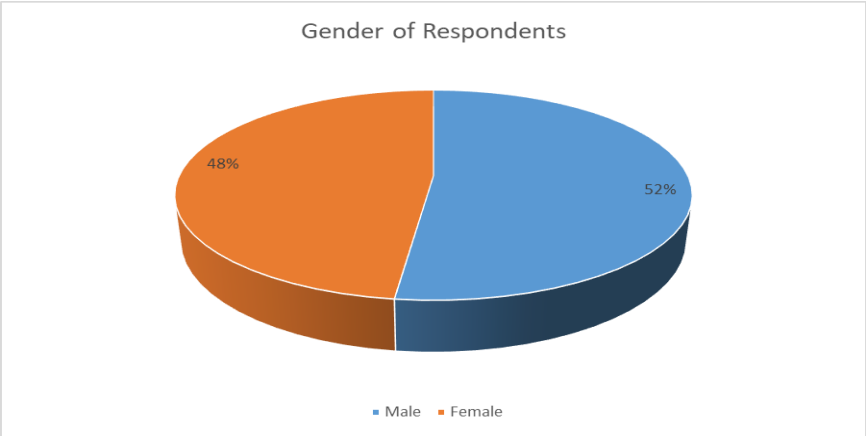

Figure 2.1: Gender of the Respondents

From figure 2.1 above, males were 213 respondents (52%) of 410 and females were 197 respondents (48%). This shows that there was almost a similar representation in terms of gender and therefore representative information was collected. As outlined by the environmental committees the duty of climate intervention is more successful when the community is involved from all demographics. In this study, there is a near-equal representation of the gender of the respondents which improves the reliability of the responses through diversity.[76] The communities living around the Tsavo Conservation Area are mainly pastoralist communities and traces of the Kamba community.[77] This study appreciates the diversity in the gender of the responses which is very important in the description of the opinions of the respondents on how climate change has influenced human security.

[76] "National Environment Management Authority (NEMA) Annual Corporate Report for 2018/19 – Resource Data" 2018
[77] "Kenya National Bureau of Statistics. *2019 Kenya Population and Housing Census"*

2.4.2 Age of the Respondents

Table 2.3: Age of the Respondents

Age of the Respondents	Frequency	Percentage (%)
18-25	62	15.0
26-33	123	30.0
34-41	90	22.0
42-49	57	14.0
50 and above	78	19.0
Total	**410**	**100.0**

As shown in Table 2.3 above, the majority of the 410 respondents, 123 (30%) were 26-33 years. 90 respondents (22%) were 34-41 years. 78 respondents (19%) were 50 years and above. 62 respondents were 18-25 years old, and finally, 63 respondents were 42-49 years old. This shows that the study involved both the youth, the middle-aged, and the elderly.

The reports outline that the majority of the inhabitants of the community consist of a youthful population which defines the majority of the pastoralist communities. In this study further, the results show that the community members aged between 26 and 33 years are the most represented age group in this study. This age group defines an active population who are responsible for most of the activities in the community. This population is also actively involved in the conservancy effort sand thus is very knowledgeable which is very appropriate for this study.

2.4.3 Level of Education among Respondents

This study also sought information on the education levels of the respondents which was a necessary diversity in the study for the determination of the awareness levels

of the influences of climate changes on the security of the community living around the conservancy area.

Table 2.4: Level of Education among Respondents

Levels of Education	Frequency	Percentage (%)
No formal Education	18	4.35
Primary School	91	22.21
Secondary School	159	38.90
Diploma	94	22.88
Degree	33	8.00
Masters/ Post graduate Diploma	13	3.20
PhD	2	0.46
Total	**410**	**100.00**

Table 2.4 above shows a majority of the 410 respondents, 301 (73.44%) had at least a Secondary school education and above. This means that most of the respondents were educated and thus able to understand the questionnaire adequately. The data from this study reflects the 2019 census data in the Kamba and Maasai community region which defines the population literacy levels of the community in the Tsavo Conservation Area as regularly moderate just like the rest of the communities in the country. The data describes a population with a literacy level of 73% which is close to the national average of 81%. The literacy levels of this study define most respondents who are high school graduates. In a review of the indigenous communities of Kenya, reports outline that the education levels in the country are above average and most citizens have either attended training through traditional education systems or the formal education system. The implication of such a society is vast knowledge in both traditional and modern practices which are important in the daily living of the citizens. In this study, the education levels

define a community that can differentiate between good and bad practices while fully understanding their roles in climate change and human security preservation.

2.4.4 Duration of Participation in Climate Preservation

This study aimed to explore the length of involvement of each of the respondents in the climate change sector/space. The main aim of this demography in the study was to define the rate of awareness of the community members in the existence of climate change and if they were able to notice that this change influences their community enough to warrant a positive change and preservation of natural resources including reclamation.

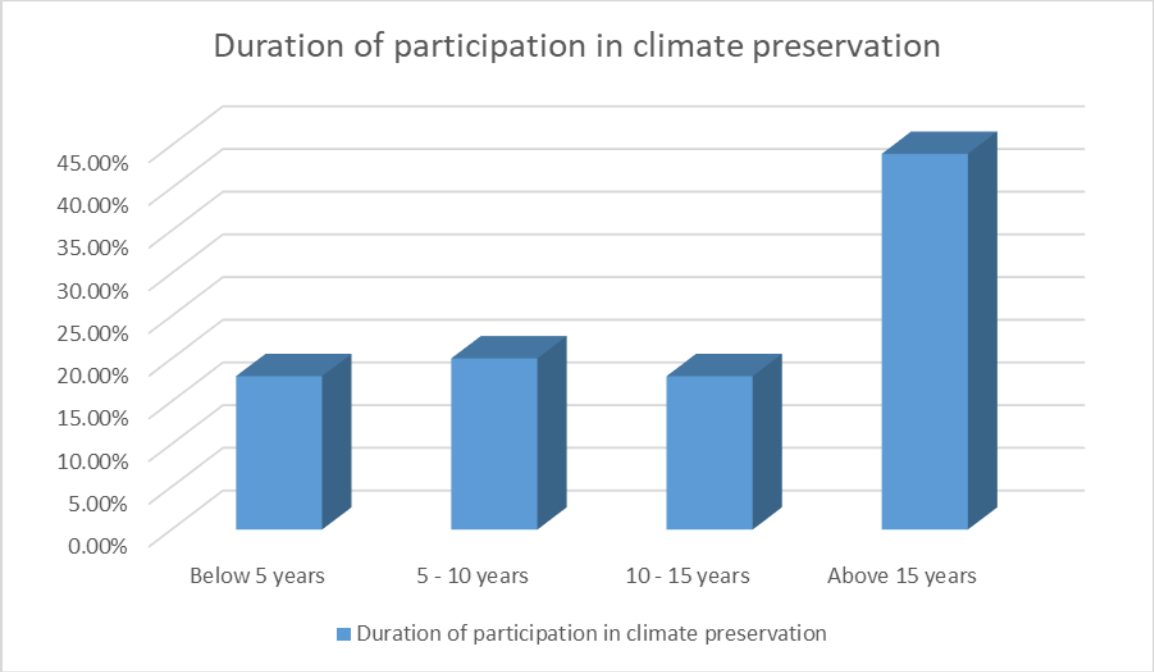

Figure 2.2: The duration Respondents have participated in climate conservation efforts

From figure 2.2 above, the majority of the 410 respondents, 336 (82.03%) had worked in the climate change sector for 5 years and above. Consequently, a significant

portion of the respondents had adequate knowledge and understanding to respond to the questionnaire. The results of this study reflect the community engagement reports from the National Environment Management Agency in Kenya which outlines the community of reserved conservancy as the major conservator stake holders of their projects.[78] In the report, the Agency reveals that more than 90% of the local community is involved in conservation efforts because they are prone to environmental degradation when not fully involved in the conservation efforts. This study data reveals that the majority of the residents have been actively engaging in conservation efforts which is positive in environmental conservation.

2.4.5 Primary Means of income/livelihood for Respondents

Table 2.5: Primary source of income/livelihood for Respondents

Source of income	Frequency	Percentage (%)
Business	66	16
Contracts and temporary employment	94	23
Permanent employment	21	5
Farming	176	43
No source of income	53	13
Total	**410**	**100.0**

Table 2.5 above shows majority of 410 respondents, 176 (43%) had farming as the main source of income. Followed by contracts and temporary employment 94 (23%), business 66 (16%), and no source of income 53 (13%). Finally, 21 respondents (5%) had permanent employment.

[78] "National Environment Management Authority (NEMA) Annual Corporate Report for 2018/19 – Resource Data." 2018".

This study data reflects the findings of the 2019 census data of the administrative units around the region of study where the data reported describes a population made up of 73% farmers with different farming activities both as subsistence farmers and commercial farmers, 56% business people with businesses activities ranging from honey sales to livestock sales and other related businesses, 64% contractors and other temporary employments with 43% pastoralists and cattle herders.[79] The diversity of employment in this study defines the conservation community with different modernized business ventures which is attributed to the arid climate of the Tsavo conservation area. This basis of trade engaged by the community outlines the basic lifestyle of the Tsavo conservation community who generally depend on other producers to meet their daily nutrition needs and income generation.

2.5 Climate Change Profile

The first objective of the study sought to examine drivers and situations of climate change on human security in, the Tsavo conservation area in Kenya. The main parameters of discussion include awareness of climate change in the country, the decline of human safety in the community and the country, and finally, opinions on what factors of climate change have influenced human security in the country.

[79] "Kenya Population and Housing Census Volume, I: Population by County and Sub-County - Kenya National Bureau of Statistics. 2019"

2.5.1 Climate Changes Witnessed in Tsavo Conservation Area

In a bid to define the drivers and effects of climate change on human security in Kenya, this study sought responses from 384 residents of the Tsavo conservation area community. The respondents were issued questionnaires through which they were requested to give a reply to an open-ended question that was geared towards the identification of the nature and description of climate changes that have been witnessed by the community members previously. Through a thematic content analysis, the data represented in Figure 5.3 was obtained.

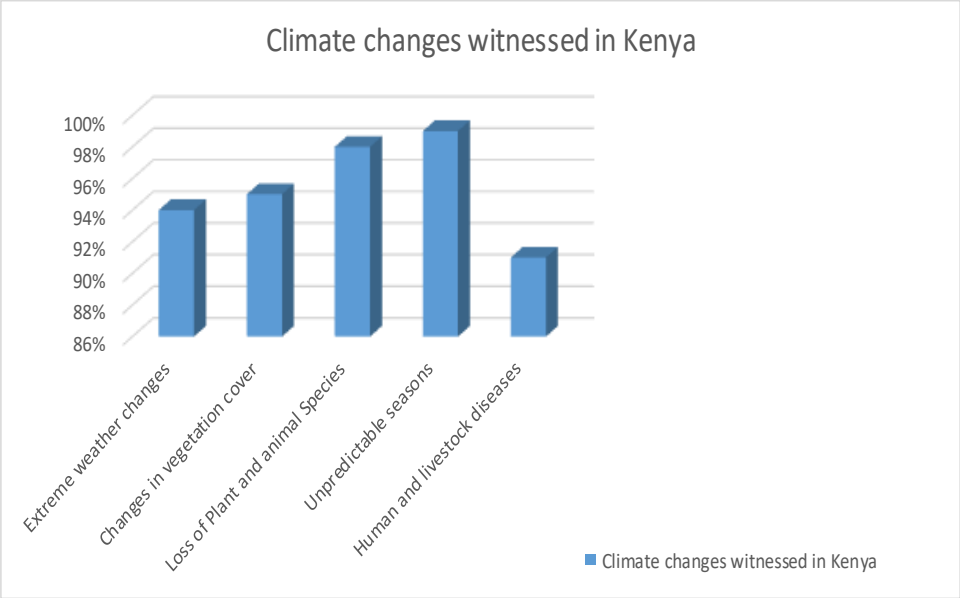

Figure 2.3 Climate changes witnessed

From the study data, there were several factors pointed out by different respondents and further summarized in a dimensional factor review. The study data

showed that most respondents had noticed the different elements of climate change from the influences to the individual factors. The data in figure 5.8 shows that 94% of the respondents had witnessed extreme weather conditions as a result of climate change, 95% of the respondents had witnessed a change in vegetation cover as a result of climate change, another 98% of the respondents had witnessed a loss of plant and animal species as a result of climate change, almost all the respondents, 99% had witnessed unpredictable weather changes which they attributed to climate change and finally 91% of the respondents acknowledged that they had experienced human and livestock diseases which were sole as a result of climate change. This finding was collaborated by interviews where one respondent results of this study were collaborated by interviews where one respondent said the following:

> *The effects of climate change have been significant, and as farmers, we have experienced many days without income. When the sun finally shines, we must explore new fields because the crops do not thrive. As farmers, we are forced to rely on small trades for survival. When the rainy season arrives, we try to make the most of it, but unfortunately, floods often come with it and destroy our crops. We are suffering more than we used to in the past. In previous years, we could anticipate how to handle our seasons and plant crops early, but the current climate conditions are highly unpredictable.*

These sentiments were shared by a key respondent from the Kenya Wildlife Service who said the following:

> *I can confirm with certainty that this area has experienced various events indicating climate change. One of the consequences is the escalation of human-wildlife conflicts due to the search for water and forage for wildlife. Climate*

change is a matter of national significance, and it is essential to involve governmental agencies in developing solutions to address it.

The findings of this study reflect reports by the NEMA which accounts for lost vegetation cover in the country due to climate change. The reports outline that the country has seen a loss of 20% of the existing vegetation cover, a factor directly associated with climate change. The reports also attribute climate change to several events and conditions that directly influence human life in the country. The different patterns in animal migration witnessed in the country were also attributed to climate change to the agency reports [80].

2.5.2 Situation and Drivers of Climate Change in Tsavo conservation Area

On a scale of one to five, where one represented a strong disagreement while five represented a strong agreement, this study through a respondent population of 384 community members of the Tsavo conservation area, sought to define the climate change issues that influence Kenya. The data was tabulated as shown in table 2.6.

Table 2.6: Knowledge/ Awareness Of Climate Change

Statements	**1**	**2**	**3**	**4**	**5**
Understanding of Climate Change					
Climate change has led to variations in temperature patterns within Kenya.	3%	2%	2%	17%	76%
Kenya frequently experiences severe and extended periods of drought.	3%	4%	3%	16%	74%
Severe floods are common in Kenya	17%	8%	6%	17%	52%
Kenya's weather patterns are shifting and becoming unpredictable.	3%	1%	3%	17%	76%

[80] "National Environment Management Authority (NEMA) Annual Corporate Report for 2018/19 – Resource Data." 2018.

Wildfires are common during the dry season	15%	7%	7%	22%	49%
Heat waves are more common now	12%	15%	10%	22%	41%
Human activity is responsible for climate change	5%	3%	7%	23%	62%
Habitat degradation and deforestation stand as significant contributors to climate change.	2%	2%	8%	19%	69%
Changes that occur naturally within the atmosphere are responsible for climate change	50%	22%	23%	3%	2%
Intensive farming (crop and animal) is a major contributor to climate change	17%	9%	13%	21%	40%

This data highlights a good level of knowledge and awareness of climate change and its impacts in Kenya among the respondents, while also showing some variations in understanding across different statements. most respondents 93% agreed that climate change has resulted in fluctuation in earth's temperatures in Kenya, indicating a high level of awareness of this issue. Similarly, a large majority of respondents 90% agreed that severe and prolonged droughts are common in Kenya, indicating a high level of recognition of this climate impact.

Only 5% of respondents believed that changes that occur naturally within the atmosphere are responsible for climate change, while 85% believed that human activity is responsible. This highlights a strong understanding of the role of human activity in causing climate change among the respondents. This indicates a high level of awareness about the impacts of climate change on extreme weather events and weather patterns in Kenya.

These findings were supported in an interview with an opinion leader who said the following

> *Climate change has significantly affected both the wildlife and the people in this community. The rising temperatures have altered animal behavior, causing them to conserve water and seek shade. Severe droughts have required communities to source water for wildlife, while floods and wildfires have increased in intensity, damaging property, and crops, and affecting both human and wildlife populations. These climate-related issues have led to declining agricultural production and food shortages. Urgent action is necessary to mitigate the impacts of climate change on all aspects of life in this community.*

Another opinion leader said the following in support of the study's findings during the interviews

> *The process of urbanization from rural areas leads to a rise in crime rates, slums, diseases, and deaths, along with the added threat of flash floods. Human activities such as deforestation and uncontrolled logging have caused habitat degradation and contributed to climate change. Sustainable practices are necessary to preserve the atmosphere as it is within human control to mitigate the impacts of climate change.*

The findings of this study align with Perry's note that human activities have accelerated climate change due to the release of toxic gases in the atmosphere which has led to the destruction of the ozone layer. The study outlines the various influences of climate change which reflect the results of this study. Further, the study outlines that a change in the environmental perception can mitigate these changes witnessed[81].

These sentiments were shared by a key respondent from the Kenya Wildlife Service who said the following:

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[81] Nightingale, Andrea Joslyn, Siri Eriksen, Marcus Taylor, Timothy Forsyth, Mark Pelling, Andrew Newsham, Emily Boyd et al. "Beyond technical fixes: Climate solutions and the great derangement." *Climate and Development* 12, no. 4 (2020): 343-352.

Extreme weather patterns have increased natural and human-induced disasters such as cyclones, floods, and severe droughts. It has impacted human mortality as these disasters lead to loss of life, vector and waterborne diseases, and respiratory diseases. Kenya is vulnerable to health-related pandemics due to a lack of strong healthcare institutions and systems to handle these diseases. It puts a dire situation on the general well-being of the people in the context of any disaster, thus a grim threat to human security.

2.6 Chapter Summary

The chapter presented findings and discussions on the profile of climate change in the Tsavo conservation area. The chapter highlighted evidence of climate change including, change in temperature patterns, draught, changes in weather patterns that are unpredictable, heat waves, and wildfires during dry seasons. Deforestation and farming activities were major contributors to climate change. The next chapter (Chapter 3) investigates the human security concerns in the Tsavo conservation area in Kenya.

CHAPTER THREE

HUMAN SECURITY CONCERNS IN TSAVO CONSERVATION AREA

3.1 Introduction

This chapter presents findings on the human security concerns in Tsavo Conservation Area, Kenya. Both quantitative and qualitative data were presented and a discussion of findings was also given.

3.2 Food Security

Respondents were asked to indicate whether there had been changes in the availability of foods that used to be there in the past.

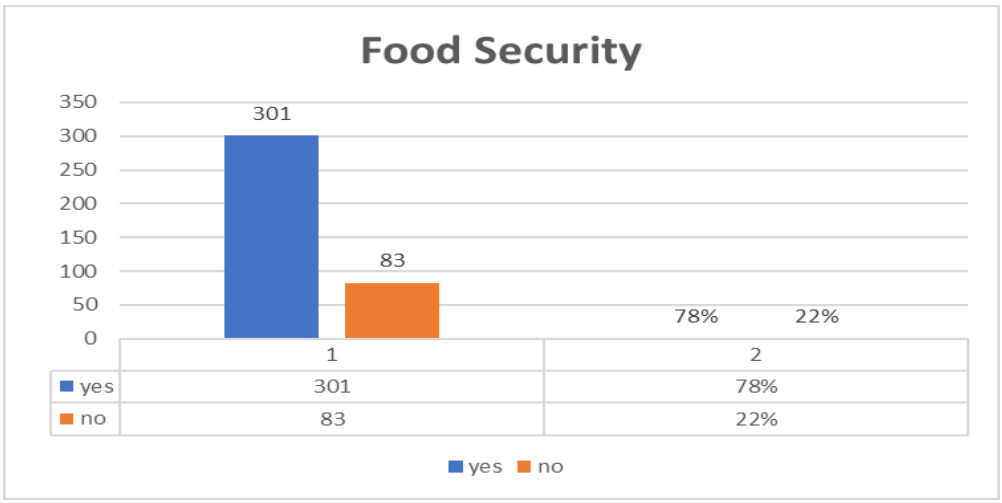

Figure 3.1: Food Security

A total of 384 respondents answered the question out of which 78% (301) indicated yes whereas only 22% (83) indicated no. Murphy was in line with the findings, that food security is an interwoven issue that rests on the delicate balance between food availability, supply, and demand. Oftentimes, food insecurity is triggered when the demand outshines the supply, hence

food shortages. However, the underlying dynamics of food insecurities go beyond incorporating factors such as agricultural policies and practices, the decline in crop production due to the prevailing environmental conditions, and high inflation rates just to mention a few. Climate change impacts the security of food in several dimensions. The over-reliance on climate-sensitive agriculture tends to intensify the vulnerability of both livestock and agricultural production to climatic changes[82].

3.3 Water Security

Respondents were also asked to indicate whether there were water challenges in their areas that were not there in the past.

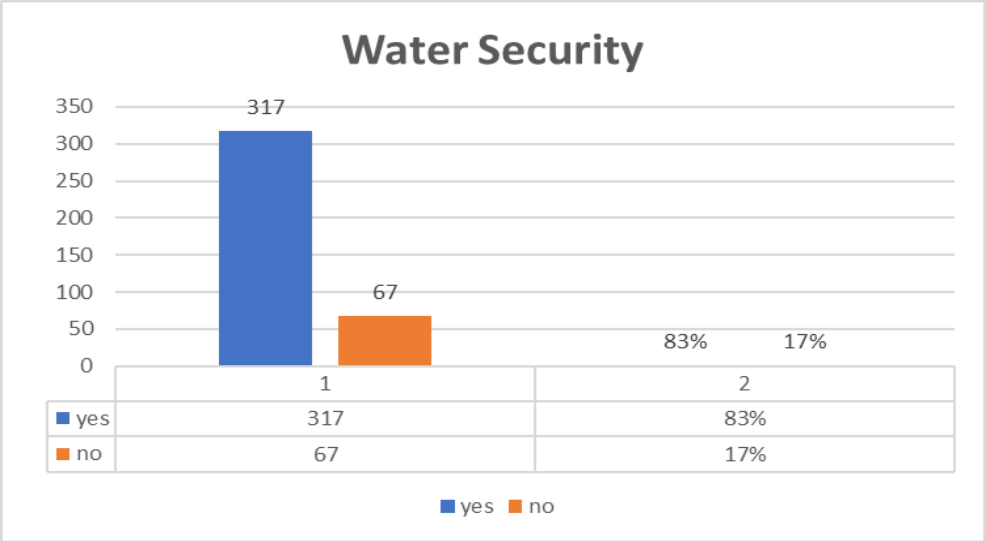

Figure 3.2: Water Security

A total of 384 answered the question where 83% (317), indicated yes whereas only 17% (67) indicated no. Results were in concurrence by those by Abdikadir who revealed that climate

[82] Murphy, Deborah. "Alignment to Advance Climate-Resilient Development, Country Case Study: Kenya." (2019).

change affects both the availability and accessibility of water in the country because most of the regions in the country depend on underground waters that rely on the availability of rainfall[83]. Human-related activities such as deforestation coupled with ballooning population growth among others have worsened the situation of water security in the country[84]. Furthermore, changes in precipitations due to climatic changes have also reduced the reliability of both underground and surface water sources, especially during droughts. The quality of water as well as the content for human consumption has also been severely affected, especially during the drought periods due to the sedimentation process.

3.4 Health Security

Respondents were asked to indicate whether there were heath concerns in their areas.

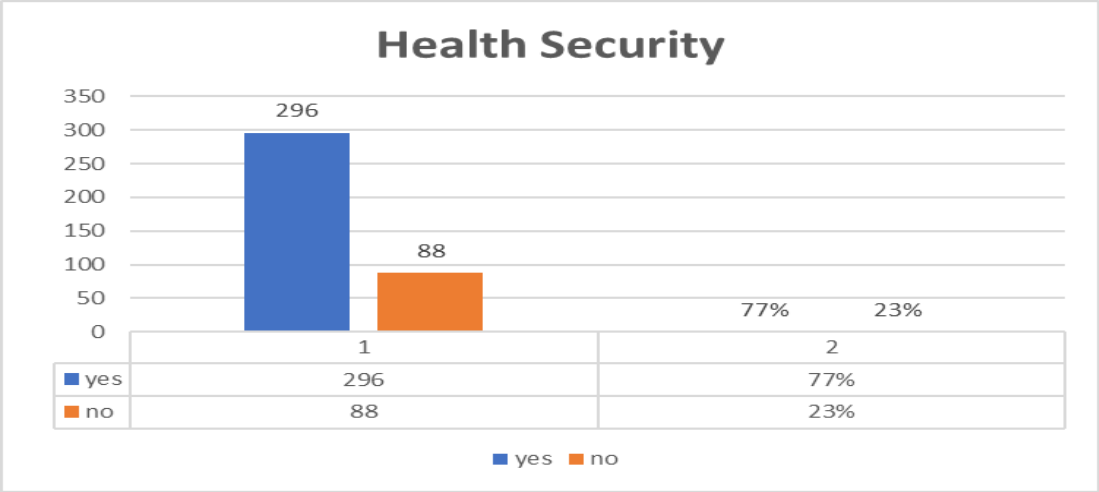

Figure 3.3: Health Security

[83] "Abdikadir, S. (2021). *Climate Change and Human Security in the 21st Century International System: The Case of Kenya* (Doctoral dissertation, University of Nairobi)".
[84] "Nyika, Joan Mwihaki. "Climate change situation in Kenya and measures towards adaptive management in the water sector." In *Research anthology on environmental and societal impacts of climate change*, pp. 1857-1872. IGI Global, 2022".

A total of 384 respondents participated where 77% (296) of the respondents indicated yes whereas only 23% (88) indicated there were no health challenges in their area. The findings are in line with Kivisi who revealed that the events emanating from clime change including droughts and floods impact health negatively, especially when they intertwine with other related health risks. For instance, an increment in climatic-related hazards may lead to the emergence of infectious diseases that emanate from both food and water contamination including diarrhea, hepatitis A, and typhoid fever. Other common diseases in climate-risk areas include Malaria, Rift Valley Fever, and Dengue fever. Some of the effects of climate change, high temperatures, and intense rainfall are considered to be among the critical factors that contribute to the emergence of these diseases[85].

Respondents were asked to reveal certain diseases that were not there in the past.

> *In recent years our community has witnessed an increase in diseases that were not there in the past, the most common health challenge has been chronic respiratory conditions which are possibly linked to the quality of the air. As well there has been a rise in water borne diseases and an increase in terminal illnesses which can be attributed to lifestyle changes and diet.*

Respondents were also asked to provide their opinions through a Likert scale where 1= no extent, 2= little extent, 3- moderate extent, 4= great extent, 5= very great extent, on statements related to human security challenges and concerns, questions that informed the Likert

[85] "Kivisi, Felister Saliku. "Japan-Kenya Relationship, The Human Security Concept and Kenya's Big Four Agenda." *American Journal of Public Policy and Administration* 4, no. 1 (2019)".

questions were on, economic security, migration and displacement, conflicts, biodiversity changes, and cultural practices.

3.5 Economic Security

Respondents were asked to know the extent to which here has been a reduction in job opportunities compared to the past in my area.

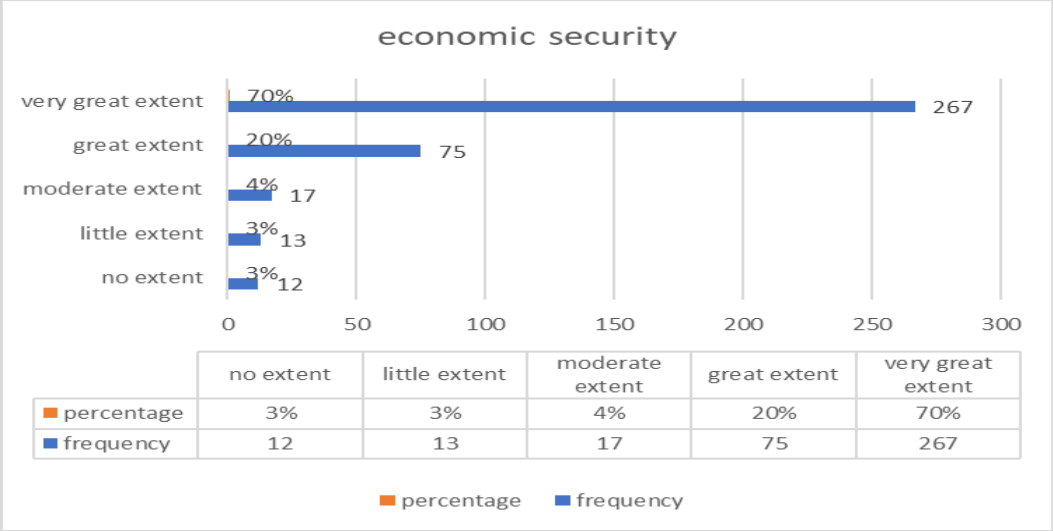

Figure 3.4: Economic Security

A total of 384 respondents participated in answering the questions, out of which the majority indicated that to a very great extent as indicated by 70% (267 participants), 20% (75 participants), indicated to a great extent, followed by 4% (17 participants) who indicated to a moderate extent, only 3% (12 participants) indicated little and no extent for each category.

From the questionnaire data, one respondent community member pointed out the loss of livelihoods.

> *As someone who lives in the Tsavo conservation area, I can attest to the fact that our community used to be pastoralists who also engaged in subsistence farming. However, the current climate conditions, such as short rains and droughts, have made it impossible for us to sustain our farming activities. The land in this area is prone to erosion and dry conditions that do not support plant growth. As a result, we have had to find alternative means of survival, which are often not enough to sustain us.*

The results of the study were also in concurrence with the interviews where one student from the Kenya wildlife Training Institute said the following.

> *It is truly disheartening to witness the suffering that the residents of the Tsavo conservation area go through because of preventable human actions. Climate change, which is primarily caused by humans, is leading to devastating consequences for these communities. As an observer, I have noticed that the residents who were once farmers and pastoralists have had to adapt to a rapidly changing environment. They are facing a multitude of challenges including loss of vegetation cover, deaths of their cattle, dried-up water sources, and lands that are no longer suitable for farming. All these issues can be linked back to climate change, which is causing extreme weather conditions such as droughts and floods. In my opinion, climate change is the main cause of the loss of income-generating activities for many households in this area.*

The findings of this study correspond with the census reports of the region where residents are shown to be majorly dependent on financial and economic aid with little or no income at all. The reports outline that the average household in the conservation area is comprised of individuals with no form of official employment or income-generating activities. The study further outlines the dependence of the community on cattle outputs which often leads to malnutrition due to the lack of nutritional supplements such as vitamins from fruits and

vegetables. The census reports categorize the administrative region as facing dire poverty and call for a need for governmental intervention[86].

3.6 Migration and Displacement

Respondents were also asked to give their opinions on the extent to which there have been changes in the migration patterns or displacement that were not there in the past such as people moving towards the wild areas.

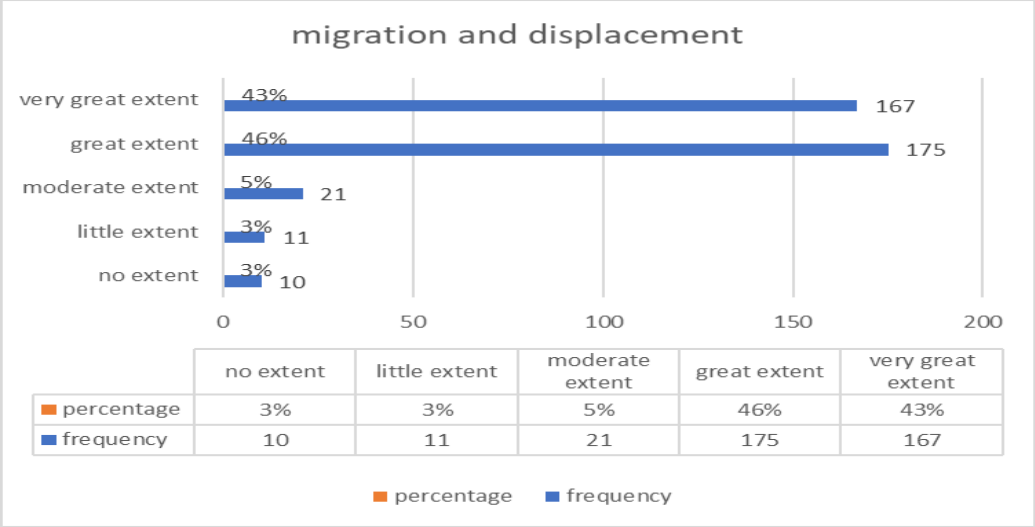

Figure 3.5: Water Security

A total of 384 participants responded, out of which 46% (175 participants) indicated to a great extent, followed by 43% (167 participants), who indicated to a very great extent, 5% (21 participants), indicated a moderate extent, followed by 3% (11 participants), who indicated little

[86] "Kenya Population and Housing Census Volume, I: Population by County and Sub-County - Kenya National Bureau of Statistics." 2019.

extent and to no extent for each category. These findings align with the findings obtained by Heriet in Turkana. The study established that climatic changes render the affected population with limited options but to seek alternative settlement places. Experience from this tends to be frustrating and thus a recipe for skirmishes in communities. The findings deduced that drought is the commonest recipe for conflicts in the county owing to pastoralism as the economic survival of the county.

3.7 Human-to-Animal Conflicts

Respondents were asked to give their opinions on the extent to which there are conflicts related to resource competition in my area that were not there in the past.

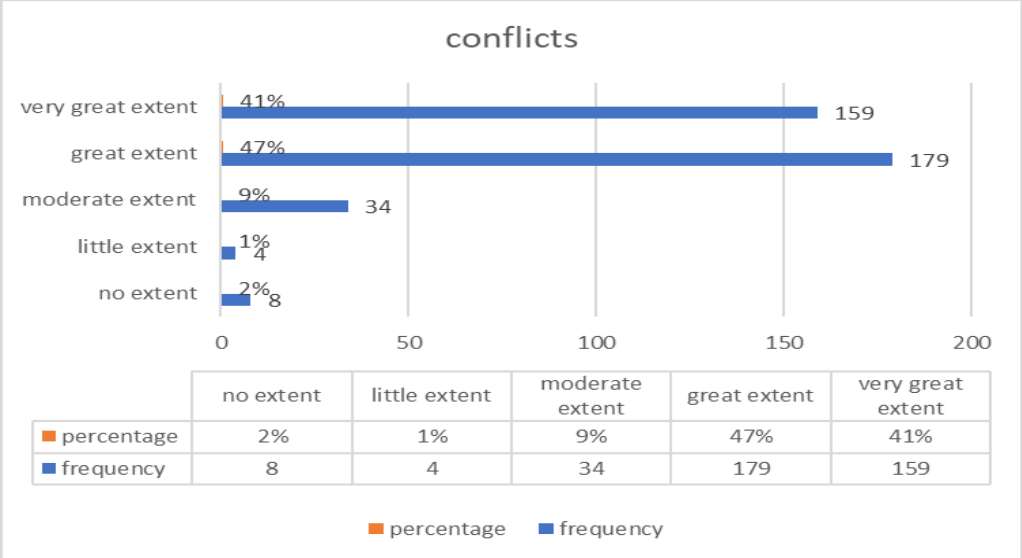

Figure 3.6: Water Security

A total of 384 participants responded to the questions, of which 47% (179 participants), revealed to a great extent, followed by 41% 159 participants), who indicated to a very great

extent, 9% indicated (34 participants), indicated to a moderate extent, 2% (8 participants), indicated to no extent, only 1% (4 participants), indicated to little extent. The findings were aligned with those by Abdikadir who revealed conflicts related to the accessibility of limited resources such as water, land, and food oftentimes occur during drought periods. The findings showed that the variabilities of climatic conditions are considered a significant risk factor for personal insecurity[87]. For instance, the depletion of natural resources including water, pasture, and land may usher in hardships for those who rely on them. This in turn increases the chances of contention over these scarce resources, thus increasing the possibility of personal conflicts. The conflicts that originate either internally or externally are linked to hardships emanating from resource scarcity during longer periods of severe droughts. For instance, prolonged drought increases the likelihood of pastoralists' migrations. Depletion of water and pasture are seen as motivating factors to engage in raiding activities and it offers a ripe opportunity to stock again. Therefore, climatic changes are perceived as a tool that triggers and perpetuates conflicts in areas prone to persistent droughts. Similarly, climate change through severe floods can also act as an impetus to personal conflicts.

3.8 Biodiversity and Ecosystem Security

Respondents were asked to rate the extent to which there had been the disappearance of animals, plants, fruits, or trees that were so common in the past.

[87] "Abdikadir, Sheikh. "Climate Change and Human Security in the 21st Century International System: the Case of Kenya." PhD diss., University of Nairobi, 2021".

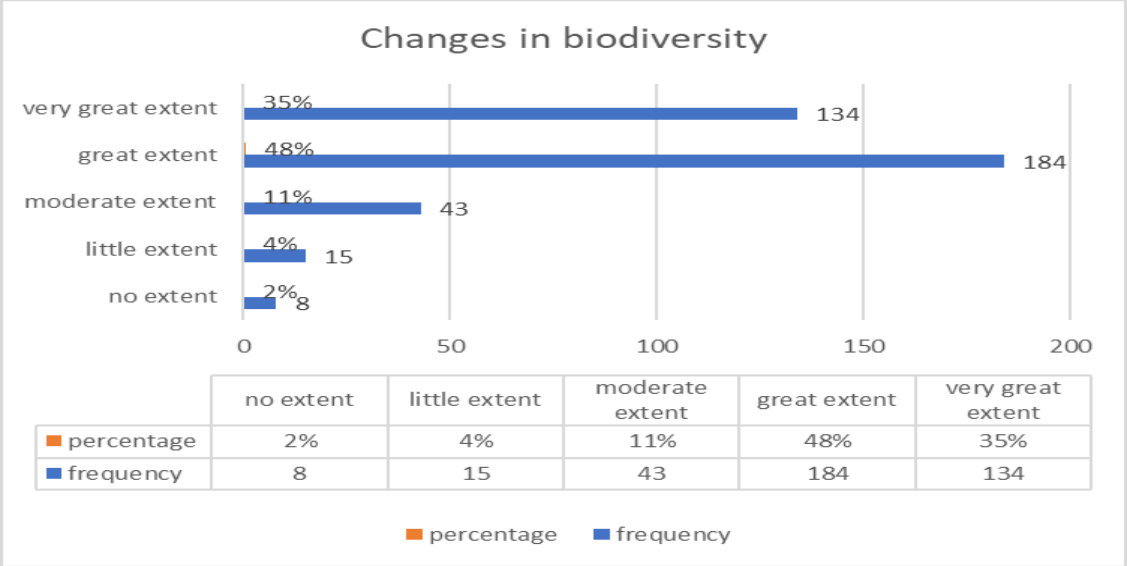

Figure 3.7: Water Security

A total of 384 participated in answering the question, out of which 48% (184 participants), indicated to a great extent, 35% (134 participants), indicated to a very great extent, followed by 11% (43 participants), who revealed changes in biodiversity and eco-systems had taken place to moderate extent, 4% (15 participants) indicated to little extent with only 2% (8 participants), who indicated there had not been changes in biodiversity and ecosystems.

3.9 Cultural and Social Securities

Respondents were asked to give the extent to which there are some cultural practices in our community have dropped at some point due to changes in the climate.

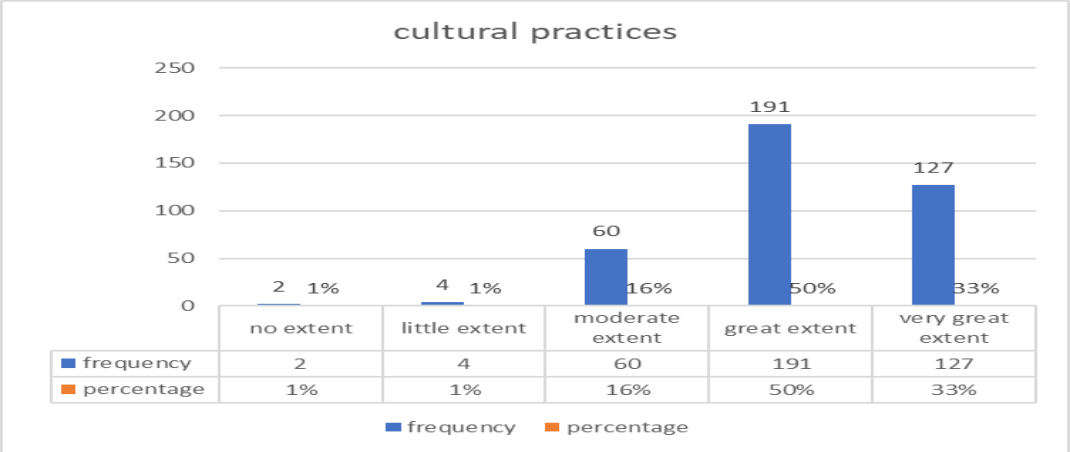

Figure 3.8: Water Security

A total of 384 participated in answering the question, where the majority indicated to a great extent which is shown by 50% (191 participants), followed by 33% (127 participants) who indicated to a very great extent, 16% (60 participants), indicated to a moderate extent, finally 1% indicated little extent and no extent for each category. The findings are in line with the human security theory which remains quite instrumental in comprehending and contributing to the understanding of human-related threats that emanate from the climate change crisis[88]. The major components of human security include; economic, food, waste, personal, environmental, and community and political security.

3.9 Decline of Human Security

In the questionnaires, the respondents were requested to indicate whether or not they agreed with the research statement human security has declined in the country over the years.

[88] "Seiyefa, Ebimboere. "How climate change impacts on regional security in West Africa: Exploring the link to organised crime." *African Security Review* 28, no. 3-4 (2019): 159-171."

From questionnaire data, 384 respondent community members were requested to include a yes or no answer in their study questionnaires.

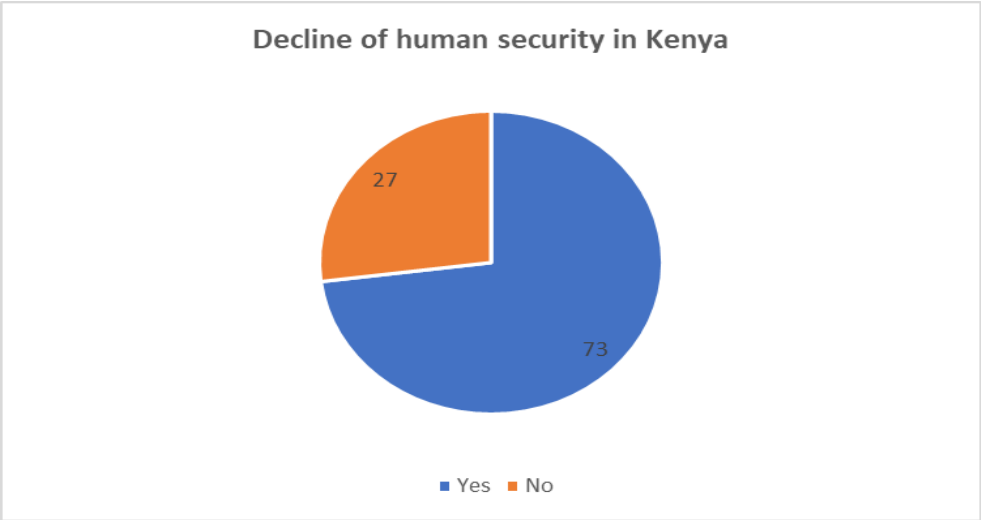

Figure 3.10: Decline of Human Security in Kenya

From the study data, 73% of the respondents agreed that there has been a decline in the human security of people in Kenya while 27% disagreed. This therefore points out that human security in Kenya has declined.

Through a comment section one of the respondent community members showed the following strong opinions:

> *The security of ordinary citizens in the country has significantly declined, affecting their health, physical wellbeing, sources of income, and shelter. Natural disasters such as droughts and floods have caused people to lose their homes, and inter-clan conflicts have exacerbated the situation, making it difficult for citizens to survive. People even face threats from wild animals, making life dangerous. The comments of a political leader reflect the gravity of the situation, with citizens being prime candidates for death. Ordinary citizens are left to struggle to meet their nutritional and other physical needs, which greatly impacts their survival.*

The findings of this study were further confirmed in the interviews by one respondent from the Wildlife Research and Training Institute who said the following.

> *The country is experiencing a significant decline in human security, which is largely attributed to climate change. As mentioned earlier, the tropical climate is vulnerable to direct sunlight, which triggers a series of climate events, including droughts, floods, and hailstorms. These climate events have a severe impact on human security, leading to the loss of homes, sources of income, and limited access to healthcare. People's lives are significantly affected, and conditions that previously existed, albeit in a less severe form, have worsened. It is crucial to mitigate climate change to preserve human security and prevent further deterioration of living conditions.*

The findings of this study reflect the findings of the United Nations Environmental Commission reports that outline a series of climate events that pose a threat to the human security of Kenyan citizens. The reports outline that human security has been on the decline with the increase of climate-related events such as flash floods, droughts, loss of vegetative cover, diseases, and infections. The physical well-being of affected residents is often affected and through human aid and governmental involvement, the reports outline several methods of interventions including building a focus on climate preservation[89].

3.10 Chapter Summary

Chapter three presented the findings on the human concerns in the Tsavo Conservancy area which included, water security, food security, health security -cultural security, personal

[89] "Kithiia, Justus, and Robyn Dowling. "An integrated city-level planning process to address the impacts of climate change in Kenya: The case of Mombasa." *Cities* 27, no. 6 (2010): 466-475".

conflicts, changes in biodiversity, migration, and displacement. The next chapter presented the link between climate change and human security in the Tsavo Conservancy area.

CHAPTER FOUR

NEXUS BETWEEN CLIMATE CHANGE AND HUMAN SECURITY IN TSAVO CONSERVATION AREA

4.1 Introduction

Chapter four presents the link between the climate change and the human security

4.2 Climate Change and Human Security Nexus

In a bid to define the effects and challenges of climate change on human security, specifically in the Tsavo Conservation area, this study through a population of 384 respondents from the Tsavo conservation area community sought to investigate the climate change - human security nexus. The study was formulated into research statements where the respondents were required to give out their opinions on how much they agreed or disagreed with specific research questions. The 5 Likert scale was used with 1 = No extent, 2 = Small extent, 3 = Moderate extent, 4 = Great extent, and 5 = Very great extent. The data is represented in table 4.1.

Table 4.1: Climate Change-Human Security Nexus in Kenya

Assertions	**1**	**2**	**3**	**4**	**5**
Impacts of Climate Change on Food Security					
Climate change has reduced food availability leading to food shortages and price increases	1%	2%	3%	16%	78%
Climate change has affected crop yields leading to food shortages and price increases	1%	2%	5%	23%	69%
Communities are facing decreased food availability as a result of displacements or loss of livelihoods caused by climate change.	6%	9%	10%	22%	53%
Climate change has affected food quantity, and diversity, leading to malnutrition and health issues, especially in vulnerable communities.	2%	5%	12%	22%	59%
The Influence of Climate Change on Health Security					
Climate change-induced mortality due to floods and droughts is on the rise in Kenya.	8%	12%	17%	25%	38%
Climate change has intensified the mental disorder burden in Kenya through livelihood loss.	4%	9%	14%	24%	49%
Climate change has led to air pollution and other environmental health risks.	8%	10%	18%	28%	36%
Impacts of climate change on conflict and individual security					
Water scarcity caused by climate change has resulted in heightened conflict levels.	5%	6%	9%	23%	57%
Food access challenges resulting from climate change have contributed to a rise in conflict.	4%	6%	10%	23%	57%
Climate change has led to a rise in Agro-pastoral conflicts due to limited access to water and pasture	6%	7%	10%	22%	55%
Climate change has led to human-wildlife climate-related conflicts	2%	3%	8%	18%	69%
Effects of climate change on Water Security					
Communities are experiencing insufficient availability of water due to the impacts of climate change.	2%	3%	9%	24%	62%
Climate change has resulted in less than enough water being available during the rainy season	2%	4%	11%	28%	55%
Climate change has resulted in less than enough water being available to wildlife and livestock leading to conflicts over water resources	3%	3%	11%	24%	59%
Climate change has led to the availability of poor-quality water to most community members leading to the spread of water-borne diseases	3%	5%	17%	25%	50%

Assertions	1	2	3	4	5
Effect of Climate Change on economic and Cultural Security					
Climate Change causes cultural erosion (change in lifestyles)	18%	14%	26%	24%	18%
Forced migration and displacements due to climate change are more rampant	9%	14%	17%	23%	37%
Climate change causes a reduction in income	1%	3%	8%	18%	70%

4.3 Effects of Climate Change on Food Security

4.3.1 Climate Change Has Reduced Food Availability Leading to Food Shortages and Price Increases.

To define the Climate change and human security nexus in Kenya this study used the factor that Climate change has reduced food availability leading to food shortages and price increases as a research statement in which the respondents were supposed to show the degree to which they agreed or disagreed. From the study 94% of the respondents agreed, 3% were moderate, and 3% disagreed. This therefore points out that climate change has reduced food availability leading to food shortages and price increases. This finding was supported by the interview by an opinion leader who said the following:

> *Living in the plains has become more expensive due to climate-related factors causing a decrease in output and resulting in increased food prices. Local people prefer to sell their produce in urban centers for higher prices or keep it for themselves during tough economic times. Honey is a prime example of a product with skyrocketing prices, making it a luxury item instead of an affordable one as it used to be.*

The results of this study reflect a report finding by the KALRO organization in Kenya which outlines that the majority of the food baskets in the country are facing low production due

to an increasing population. The study aims to develop food security recommendations amidst the uncertainty of climate change, increased diseases, and reduced agricultural output of the country. The report outlines the issues related to the reduced food production including hunger and increased poverty levels which are all important aspects of human security[90].

This finding was supported by an interview with one opinion leader who said the following.

> *The community in this conservation area has been severely affected by climate change. Previously, the community lived a regular life with abundant resources and sustenance. However, with the advent of prolonged droughts and messy rainy seasons, the face of the community has changed drastically. People have been displaced from their homes, and wildlife conflicts have become commonplace, resulting in deaths. The impact of climate change on this community serves as a reminder of the urgent need for sustainable practices to mitigate the impact of climate change.*

In support of these findings, Nightingale revealed that food security in the country outlines that the conservation areas along the Tsavo reserves are comprised of communities that are in dire need of support from the government through food support, shelter, and mitigations such a building dams and long-term water projects to improve the human security of the area residents. The reports also acknowledge that nexus events related to climate change are partially to blame

[90] "Nightingale, Andrea Joslyn, Siri Eriksen, Marcus Taylor, Timothy Forsyth, Mark Pelling, Andrew Newsham, Emily Boyd et al. "Beyond technical fixes: Climate solutions and the great derangement." *Climate and Development* 12, no. 4 (2020): 343-352".

for some of these conditional threats on human food security including droughts, flood water pollution, and climate-related diseases.[91]

This argument was strongly supported by one community member who said the following

> *Upon analyzing the events and disasters associated with climate change, it is evident that they inflict immense pain on people. The uncertainty brought about by these events, including food and health insecurities, is palpable. When disasters such as floods and droughts strike, residents are left to either rely on external aid or face the risk of losing their lives, making it a tragic sequence of events.*

These findings were further supported in the interviews by one opinion leader who said the following:

> *Human security and climate change are closely intertwined. Climate change has a direct impact on human security by causing displacements and loss of income sources. For instance, droughts that result in the death of animals also lead to the loss of basic income sources that people rely on to access essential services like healthcare. Disasters caused by climate change often result in a complete wipeout, leaving people with only their lives, which makes them vulnerable to various factors that undermine human security.*

The findings of this study reflect the findings of the United Nations organizations' climate reports which outline climate events as key influencers of human security. The reports acknowledge that even though the influence of climate change is slow and often goes unnoticed

[91] "Lala, Fredrick, Patrick I. Chiyo, Erustus Kanga, Patrick Omondi, Shadrack Ngene, William J. Severud, Aaron W. Morris, and Joseph Bump. "Wildlife roadkill in the Tsavo Ecosystem, Kenya: identifying hotspots, potential drivers, and affected species." *Heliyon* 7, no. 3 (2021)".

in some areas, in specific areas it is often more pronounced, and these are the areas that face the highest threats to human security. The reports further outline the mitigation recommendations that could be adopted in aid of the influenced communities[92] .

4.3.2 Climate Change Has Affected Crop Yields Leading to Food Shortages and Price Increases

The study sought the opinions of the respondents on the research statement, Climate change has affected crop yields leading to food shortages and price increases. Through a respondent population of community members of the Tsavo conservation area, 92% of the respondents agreed, 5% were moderate, and 3% disagreed. This therefore points out that climate change has affected crop yields leading to food shortages and price increases which is a contributing factor to the human security nexus in the country. This finding was supported in an interview by a member of the Wildlife research and training institute who said the following.

> *Climate change has had a significant impact on human security, particularly in the food sector. In the dry seasons, there are often food shortages, which can also occur during rainy seasons when crops are destroyed by floods or homes are damaged. As a result, people have to look for alternative sources of food, which can be expensive and lead to malnutrition and hunger.*

The findings of this study reflect a study by the United Nations human security studies that outline that food security has been influenced by the low production witnessed in the equatorial region sighting an increased desertification where the studies show that the Sahara

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[92] "Okita-Ouma, Benson, Michael Koskei, Lydia Tiller, Fredrick Lala, Lucy King, Richard Moller, Rajan Amin, and Iain Douglas-Hamilton. "Effectiveness of wildlife underpasses and culverts in connecting elephant habitats: a case study of new railway through Kenya's Tsavo National Parks." *African Journal of Ecology* 59, no. 3 (2021): 624-640".

Desert is gradually increasing which is continually affecting the established forests and the cool climate areas which are an important production area for the region. The studies note that these events will lead to a dire food insecurity situation in the next 3 decades if not mitigated through restorations, climate interventions, and reclamations[93].

4.3.3 Displacements or Loss of Livelihoods Due to Climate Change Has Reduced Food Availability to Communities

Through the research objective Climate change and human security nexus in Kenya, the research sought the level the respondents agreed or disagreed with the research statement displacements or loss of livelihoods due to climate change has reduced food availability to communities. The main security issue of discussion in this statement was `the reduced food availabilities to the communities displaced by the floods resulting from the climate changes. 75% of the respondents agreed, 10% were moderate, and 15% disagreed. This therefore points out that displacements or loss of livelihoods due to climate change has reduced food availability to communities. This finding was supported by an interview with an official from the Ministry of Tourism and Wildlife who said the following:

> *The government has requested our assistance through disaster management programs to provide food, clothing, and other necessities to inaccessible regions using our wildlife monitoring helicopters due to the increasing number of displaced communities. Displacement often results in the loss of all belongings, including food sources, leaving people with no means of survival. Food delivery is required during dry seasons and times when residents are forced to leave their homes. In times of*

[93] "Lala, Fredrick, Patrick I. Chiyo, Erustus Kanga, Patrick Omondi, Shadrack Ngene, William J. Severud, Aaron W. Morris, and Joseph Bump. "Wildlife roadkill in the Tsavo Ecosystem, Kenya: identifying hotspots, potential drivers, and affected species." *Heliyon* 7, no. 3 (2021)".

> *environmental hostility, animals tend to migrate, and the same applies to human communities.*

The findings of this study reflect the findings by Henschel who revealed that it is not uncommon to see carcasses of dead cattle when these nexus tragedies strike[94].

4.3.4 Climate Change's Impact on Food Quantity, Variety, And Health in Vulnerable Communities

The study analyzed the responses of the 384 correspondents in a bid to define how climate change has affected the quantity and variety of food they consume and if this correlates with the increasing malnutrition and other arrays of health concerns particularly in the vulnerable communities. The respondents were tasked to respond with the level to which they agreed or disagreed with the statement. 81% of the respondents agreed, 12% were moderate, while 7% disagreed. This therefore points out that climate change has affected the quantity and variety of food that households consume leading to malnutrition and other health issues, particularly in vulnerable communities. This finding was supported by an Interview where one respondent a KWS (TCA) official said the following:

> *In the past, food was abundant, including naturally growing fruit trees, vegetables, grains, and livestock. However, due to changes in the environment, the vegetation has vanished, and the land is no longer arable, forcing people to move to areas where farming is still viable. In these areas, there is limited space for livestock and people are planting specific staple food crops to feed their families, which is leading to malnutrition and health problems such as stomach ulcers.*

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[94]"Henschel, Philipp, Lisanne S. Petracca, Sam M. Ferreira, Steven Ekwanga, Steven Dennis Ryan, and Laurence G. Frank. "Census and distribution of large carnivores in the Tsavo national parks, a critical east African wildlife corridor." *African Journal of Ecology* 58, no. 3 (2020): 383-398".

The findings of this study concur with the findings by Mseja on climate change in the vulnerable communities outlining that the major cause of malnutrition was due to reduced food availability and lack of variety available to these communities, all caused by climate change. The report recommended that the authorities act now on the critical issue of Climate change before it wipes out a large human population living in arid areas[95].

4.4 Effects of Climate Change on Health Security

4.4.1 Escalation of Climate Change-Induced Mortality: Floods and Droughts

To define the human security nexus in Kenya concerning climate change, this study sought information on how climate change has influenced the health security of the community members of the Tsavo conservation area. In this study, the research statement Climate change-induced mortality occasioned by floods and droughts has escalated in Kenya was presented in a study questionnaire where 63% of the respondents agreed, 17 were moderate, and 20% disagreed. This therefore points out that climate change-induced mortality occasioned by floods and droughts has escalated in Kenya.

These findings were supported in an interview by an opinion leader who said the following.

> *Residents in this area often suffer from the devastating effects of floods and droughts. These natural disasters result in the loss of human and animal lives, causing immense pain to the affected communities. Over time, the dry seasons have become more severe, leading to food shortages and an increased risk of malnutrition*

[95]"Mseja, Gideon A., Alex W. Kisingo, Emanuel Stephan, and Emanuel H. Martin. "Dry season wildlife census in Mkomazi National Park, 2015." *Protected Areas in Northern Tanzania: Local Communities, Land Use Change, and Management Challenges* (2020): 133-143".

> *and disease. The community once thrived on fertile land with abundant food sources, and deaths during the dry season were rare. The floods were less dangerous and did not carry the same risks as they do now. Today, the weight of flood waters cannot be easily predicted, adding to the uncertainty and danger for those affected.*

These findings are in concurrence with the Obwocha project in west Pokot, the project outlines that hunger is one of the leading causes of mortality amongst the population where children with malnutrition are most prone to loss of life. Kwashiorkor and other malnutrition-related infections such as lack of certain essential vitamins and minerals in the body are also a leading cause attributed to the dire conditions that can be related to the climate conditions of the area. These findings show how much human health security has been influenced by climate change[96].

4.4.2 Climate Change's Impact on Livelihoods and the Mental Disorder

The respondents were further asked to define how much they agreed or disagreed with the research statement Climate change-induced livelihood losses escalate the burden of mental disorders in Kenya. From the study, 73% of the respondents agreed, 14% were moderate, while 13% disagreed. This therefore points out that the loss of livelihoods due to climate change has increased the mental disorder burden to Kenya. This finding was supported by an interview with an opinion leader who had the following to say.

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[96] "Obwocha, Everlyne B., Joshua J. Ramisch, Lalisa Duguma, and Levi Orero. "The relationship between climate change, variability, and food security: understanding the impacts and building resilient food systems in west Pokot county, Kenya." *Sustainability* 14, no. 2 (2022): 765".

> *As a health expert, I want to bring attention to the often-overlooked mental illnesses that can manifest in forms other than severe, untreatable disorders. Even healthy individuals can experience mental health issues, such as stress and depression. The loss of homes and livelihoods, along with the innate human desire to care for loved ones, can contribute to the development of mental conditions that negatively impact overall health. These conditions often increase in frequency during natural disasters, disease outbreaks, and situations where there are limited options for mitigation.*

The findings of this study correspond to the Kogo on climatic changes and food and agriculture where the scholars revealed that lack of food and job opportunities had resulted in increased mental cases where death is the leading outcome followed by broken families, loss of community values such as increase in banditry and poaching, and children are also rendered homeless in the process. The findings of this study signify a critical balance between climate change and the mental health security of the Tsavo conservation community[97].

4.4.3 Climate Change Has Led to Air Pollution and Other Environmental Health Risks

The respondents were further requested to define the climate change and human health security nexus through the research statement Climate change has led to air pollution and other environmental health risks. The study through the Tsavo Conservation Community sought to define the relationship between climate change and the health security of the community. 64% of the respondents agreed, 18% were moderate, and 18% disagreed. This therefore points out that

[97] "Kogo, Benjamin Kipkemboi, Lalit Kumar, and Richard Koech. "Climate change and variability in Kenya: a review of impacts on agriculture and food security." *Environment, Development and Sustainability* 23 (2021): 23-43".

climate change has led to air pollution and other environmental health risks. This finding was supported by an interview with an opinion leader who said the following.

> *It is unclear if the local community is affected by severe environmental pollution caused by human activities in the area. Despite being a remote region with a low population, the air quality has deteriorated over time, leading to the emergence of seasonal infections like influenza. As a result, vulnerable groups such as children and elderly people have been hospitalized due to these infections. In addition, conditions such as pneumonia, tuberculosis, and other airborne diseases are becoming more common due to changing climate conditions.*

The findings of this study reflect a report by the ministry of health that defines the rise in respiratory infections in local rural communities that is attributed to the air pollution in major cities including mining and oil drilling activities. The more the environment is cleared of trees and other beneficial bio digesters that nature provides such as some types of fungi, the more the people are exposed to health risks, the reports also outline the increase in heat-related infections as a result of air pollution from human activities such as mining which leaves the grounds exposed and releasing more toxic gases in the atmosphere.

4.5 Effects of Climate Change on Conflict and Personal Security

4.5.1 Climate Change Has Led to Increased Conflict Due to An Increase in Water Scarcity

In a bid to establish if climate change has led to increased conflict due to an increase in water scarcity, this study questioned 384 correspondents on the level they agreed or disagreed. 80% agreed, 9% were moderate, and 11% disagreed. This therefore points out that climate change has led to increased conflict due to an increase in water scarcity. This was affirmed in an interview with an Opinion leader (TCA) who said the following:

> *There have been increasing reports of conflicts arising from the scarcity of water resources, resulting in violence in some cases. Communities lack proper guidelines on how to share the limited water resources based on their needs, which can lead to disagreements and conflict. The root cause of these issues is climate change, as water sources are drying up shortly after rainy seasons. If climate change can be reversed, the conflicts due to water scarcity would not occur.*

The 2020 report by the research department of Kenya Metrological Services indicated the outbreak of conflicts within communities if there were no guidelines on how to use the scarce water resources. To stop the conflicts and improve the aspect of human security they outlined the major cause of climate change and called for rapid action on the conservation of water catchment areas as well as protecting the scarce water resources to avoid pollution that could lead to poisoning of conflicting communities that share these resources.

4.5.2 Climate Change Has Led to Increased Conflict Due to Difficulties in Accessing Food

The study looked to confirm if it is true that climate change is paving the way for conflicts due to increasing difficulties in accessing food. Of the 384 respondents, 80% agreed, 10% were moderate, and 10% disagreed. This therefore points out that climate change has led to increased conflict due to difficulties in accessing food. This finding was supported by an interview with the Kenya Wildlife Service (TCA) official who said the following:

> *The necessity for food is a fundamental human need, and individuals will go to great lengths to meet this need, even if it results in conflict. Unfortunately, climate change has exacerbated this situation, as food production has decreased and is now inadequate to feed the growing population. Consequently, there have been more disputes over access to food, with people resorting to fighting, stealing, and even killing. This trend is worrying, and unless the effects of climate change are addressed promptly, the*

situation is expected to worsen. Climate change is a serious problem that must be tackled urgently.

4.5.3 Climate Change Has Led to A Rise in Agro-Pastoral Conflicts Due to Limited Access to Water and Pasture

The study aimed to find out if Climate change has led to a rise in Agro-pastoral conflicts due to limited access to water and pasture within the pastoral communities. 77% of the respondents agreed, 10% were moderate, and 13% disagreed. This therefore points out that climate change has led to a rise in Agro-pastoral conflicts due to limited access to water and pasture. An Opinion Leader (TCA) supporting the same in an interview said the following:

> *As a result of global warming, the water sources that the Agro-pastoral communities have traditionally relied on for their animals and personal use are diminishing. Consequently, individuals are competing for the remaining limited water resources, with some even claiming ownership of natural water sources and preventing others from accessing them. This is unjustifiable as everyone should have equal access to these resources, and this lack of access has resulted in conflicts. Communities that previously migrated in search of water are now exhausted due to the scarcity of water. As people become more aware of the harmful effects of climate change, they are increasingly settling in one location and fighting for the limited available water resources.*

4.5.5 Climate Change Has Led to Human-Wildlife Climate-Related Conflicts

This study in a bid to define if climate change has led to human-wildlife climate-related conflicts asked the correspondents to indicate the level to which they agreed or disagreed with the statement. 87% agreed, 8% were moderate, and 5% disagreed. This therefore points out that climate change has led to human-wildlife climate-related conflicts. This was supported by an interview with an official from the Ministry of Tourism and Wildlife as captured below:

> *The conflicts between humans and wildlife are largely attributed to climate change. Human activities such as farming are encroaching on the natural habitats of wild animals, and in turn, these animals feed on the crops and produce that humans grow, leading to conflict. Humans respond to these conflicts by trapping and killing these animals, which have nowhere else to go. As a result of the human threat to their population, wild animals have become more instinctive and have begun to attack humans. During periods of extreme heat, wild animals seek out water and shelter in homesteads, which can lead to conflict with humans. Large reptiles, such as dangerous snakes, pose a significant threat during these times, and humans may attack them, especially when they enter homes. These are just a few examples of how climate change has exacerbated human-wildlife conflicts.*

The findings of this study align with those of the KALRO report that indicated humans are likely to cause human-wildlife conflicts when they move into wildlife habitats to find space for agricultural produce due to climate change in their habitats. The report outlines risks such as insecurity from raging wild animals, as well as deaths because of dangerous bites from snakes. The report also forwarded human wildlife interaction for further studies terming it as a high human security risk.

4.6 Effects of Climate Change on Water Security

4.6.1 Climate Change Has Resulted to Less Than Enough Water Being Available to Communities

From the study objective to define the climate change and human security nexus in Kenya, a study on the effects of climate change on water security was carried out. The respondents were to indicate to what extent they agree or disagree with the research statement Climate change has resulted in less than enough water being available to communities. 86% agreed, 9% were moderate, and 5% disagreed. This therefore points out that climate change has

resulted in less than enough water being available to communities. This finding was supported in an interview with the ministry of wildlife and tourism representative who said the following:

> *I can confirm that the arid plains of the Tsavo Conservation Area are facing a drastic water shortage, especially during dry conditions. This area relies on seasonal rivers, and previous satellite images show a reduction in water bodies or their sizes by season. Previously, the available water supply could sustain both the human and wildlife populations in the area. However, currently, I can confirm that without intervention, even the wildlife would not survive the year. The same applies to the human population, which heavily relies on outside help from well-wishers and governmental aid.*

The findings of this study are in agreement with the reports of the United Nations climate review that outlines a decrease in fresh water sources globally due to the changing climate conditions. The reports outline that several communities have been forced out of their homesteads due to the increasingly drier conditions that come with the drought seasons. The reports state that the communities are forced to adopt new migration patterns away from the initially developed patterns more so for the pastoralist communities due to the changing season patterns. From the reports, one respondent gave a story of how they had a community well that never dried imp during her childhood however the community well was replaced by a large hole in the neighborhood since it only taps the rain waters in the rainy seasons and dries up at the end of the season. The story outlines that the community has to make 3-4 day journeys regularly in

search of water. They are exposed to dangers including dehydration and attacks from wild animals in the nights which they have to spend in the wild while in search of the water[98].

4.6.2 Climate Change Has Resulted to Less Than Enough Water Being Available During the Rainy Season

The respondents were further asked to indicate the level of agreement or disagreement with the research statement Climate change has resulted in less than enough water being available during the rainy season. 83% agreed, 11% were moderate, and 6% disagreed. This therefore points out that Climate change has resulted in less than enough water being available during the rain season. These findings were accentuated by an interview respondent from the Wildlife Research Institute who said the following.

> *Climate change has disrupted the regularity of rainy seasons in an area where vegetables used to grow during short rainy seasons and cereals during long ones, leading to a decline in food production. The limited water-holding capacity of the soil and deep underground water table makes it difficult to construct a sustainable dam without government intervention, which is unaffordable for the residents. The unpredictable cycles of rainfall due to climate change have adversely affected local agricultural practices, leaving the locals struggling to make ends meet. The government's financial assistance is needed to construct a sustainable dam to address the water shortage and boost agricultural production in the area.*

[98] "Kinoti, Kibetu Dickson, Colbert Mutiso Jackson, and Mwangi Joyce Muthoni. "Dynamics of Climate Change Adaptations on Horticultural Land Use Practices around Mt. Kenya East Region." *Am. J. Environ. Prot* 7 (2018): 1-6".

The findings of this study reflect the findings by the KALRO reports that outline that the rainfall levels in the study area are becoming smaller. The study also recommends the researchers who are working hard to develop droughts resistant crops to assist in the security of food in the region. Further through the young innovators' segment of the reports, a segment was dedicated to an innovation where water was trapped from the atmosphere using nets as dew in the night. The application of this water tapping procedure was shown to be successful in some counties of rift valley including Naivasha. The study outlines that such mitigations could be useful in the region which was outlined as heavily affected by water insecurity.[99]

4.6.3 Climate Change Has Resulted in Less Than Enough Water Being Available to Wildlife and Livestock Leading to Conflicts Over Water Resources

From the study, 83% of the respondents agreed, 11% were moderate, and 6% were moderate. This therefore points out that climate change has resulted in less than enough water being available to wildlife and livestock leading to conflicts over water resources. The main goal of this study statement was to define the effects of climate change on water security. This finding was supported by an interview with one respondent opinion leader who said the following.

> *The region is notorious for internal conflicts, which have driven its residents to become hostile to one another and even visitors. Community wells used to be the primary sources of water in the area, and each community was confined to its designated well to maintain peace. During dry spells, communities could trade water to ease the burden of those who did not want to travel long distances in search of water. However, this arrangement was*

[99] "Draft Genome Sequence of Streptococcus Agalactiae KALRO-LC1 Strain Isolated from a Mastitis-Infected Camel in Laikipia County, Kenya | Microbiology Resource Announcements. 2022".

> *disrupted by the introduction of firearms and prolonged dry conditions that left some communities desperate for water and pasture. As a result, clan conflicts have erupted, leading to significant loss of life and property.*

The findings of this study agree with the United Nations reports that place the Tsavo conservancy area as one of the inter-clan war hotspots fueled by the struggle for natural resources. The reports outline that due to the inadequate water, food, and pasture conditions coupled with an unending human desire, the communities living in the area are categorized as the most hostile communities in the country with unending cases of livestock banditry and family displacements due to wars on territorial expeditions. The reports outline the need for increased security in these regions to help alleviate the problems of insecurity[100].

4.6.4 Climate Change Has Led to the Availability of Poor-Quality Water to Most of The Community Members Leading to the Spread of Water-Borne Diseases

In this study's objective to define climate change and human security nexus in Kenya, the respondents were asked to indicate the level of agreement or disagreement with the statement Climate change has led to the availability of poor-quality water to most of the community members leading to spread of water-borne diseases. 75% agreed, 17% were moderate, and 8% disagreed. This therefore points out that climate change has led to the availability of poor-quality water to most of the community members leading to the spread of water-borne diseases. This

[100] "Ani, Kelechi Johnmary, Vincent Okwudiba Anyika, and Emmanuel Mutambara. "The impact of climate change on food and human security in Nigeria." *International Journal of Climate Change Strategies and Management* 14, no. 2 (2022): 148-167".

finding was supported by a student from the Kenya Wildlife Research Institute who said the following.

> *During my undergraduate research, I focused on the relationship between wildlife, humans, and the environment. One of my significant findings was that during the rainy season, there was a high incidence of water-borne infections in the human population. The study also found that some animals that shared the polluted water from the flood flows became sick. The primary cause of the infections was identified as runoff water that flowed into the region from the highlands. The study highlights how the environment can be harsh, and local communities and animals pay the price for the human impact.*

The findings of this study reflect the findings from Obwocha which has linked several opportunistic waterborne infections to polluted water sources. The reports note that when the pollution messes with the PH value of the rivers and streams the animals in the wild through which the waters flow and the human beings depending on the water are affected. The reports further identify these diseases as life threatening and would influence the health security of the country hence the need for sustainability actions and climate conservation proceeds[101].

4.7 Effect of Climate Change on Economic and Cultural Security

4.7.1 Climate Change Causes Cultural Erosion (Change in Lifestyles)

In a bid to define the human security nexus concerning the climate changes witnessed in the country, this study through a respondent base of community members of the Tsavo

[101] "Obwocha, Everlyne B., Joshua J. Ramisch, Lalisa Duguma, and Levi Orero. "The relationship between climate change, variability, and food security: understanding the impacts and building resilient food systems in west pokot county, Kenya." *Sustainability* 14, no. 2 (2022): 765".

conservation community sought the opinions of the respondents on the research statement Climate Change causes cultural erosion (change in lifestyles). This study sought to define the effects of climate change on economic and cultural security. 42% agreed, 26% were moderate, and 32% disagreed. In this study, the cultural influence of climate change affecting the Tsavo conservation community is up for debate. However, one respondent, an opinion leader from the interviews had the following to say concerning the study statement

> *The climate issues in this community partially contribute to the cultural erosion in the region. However, it is not entirely accurate to attribute cultural erosion to climate changes, as they are measured over 30 years. It would be inefficient to use this as a measure of cultural erosion, which is an event occurring almost daily due to other influences. From my perspective, the main cause of cultural erosion is modernity and religion, including Christianity and Islam. The community's cultural values have been disregarded by these new religions. Although the struggle for survival has led to the erosion of some cultures such as boundary demarcations, it is not as intense as the impact of modernity and religion on cultural erosion.*

The findings of this study reflect a historical study on the communities of Kenya where the key factors outlined as the major accelerators of cultural erosions are modernity and religion. The study also notes that the plane lands communities through trade interactions fueled by their limited resources have led to cultural interactions and adoptions. Thus it is only fair to conclude that climate change has not directly led to cultural erosion in the Tsavo conservation community. However, it has greatly contributed through droughts, famines, diseases, and the need for survival where even the trees that the community previously depended on for their education have been replaced by the modern medication. The economic and cultural security of the Tsavo conservation community thus is highly dependent on such factors related to climate change.

4.7.2 Forced Migration and Displacements Due to Climate Change Is More Rampant

The study aimed to unveil the effect of Climate Change on economic and Cultural Security occasioned by forced migrations and displacements. The study asked correspondents to respond with the level at which they agreed or disagreed with the statement. 60% agreed,17% were moderate, and 23% disagreed. This therefore points out that forced migration and displacements due to climate change are more rampant. This finding was echoed in an interview with Opinion leaders (TCA) who said:

> *The impact of climate change on economic and cultural communities is profound. Harsh climate conditions have forced vulnerable communities to migrate, leading to the displacement of communities whose land they migrate into. This is a common occurrence for communities that depend on livestock for their sustenance, as the loss of livestock forces them to search for agriculturally productive land for farming as an alternative. However, conflicts arise on how they acquire these lands, especially if they must displace an already existing community that inhabits the area. These migrations and displacements often result in a split in cultures, and the affected communities must adapt to the economic activities of their neighbors. Moreover, there is a significant threat to human security as such processes often result in fatal conflicts.*

The findings in this study resonate with Chaudhry's study. The study faulted climate change as the center stage for conflicts that arise when communities move to displace others. Due to this forced migration, there is deterioration of economic and cultural security as

communities must adapt to their new surroundings that in most cases include preparation in case of attacks by hostile communities moving because of adverse climate change[102].

4.7.3 Climate Change Causes Reduction in Income

Finally, in the effects of climate change on the economic and cultural security of the Tsavo conservation community, this study sought to define how Climate change causes a reduction in income. The study through Tsavo conservation community respondents sought the extent to which they agreed or disagreed with the statement Climate change causes a reduction in income. 88% agreed, 8% were moderate, and 4% disagreed. This therefore points out that climate change causes a reduction in income. The findings of this study were echoed by one member of the Kenya Wildlife Service (TCA) who said the following.

> *The economic activities of the residents in this area yield low returns, particularly during the dry seasons when cattle prices can drop significantly below their normal value. Cattle that would typically sell for over twenty thousand Kenyan shillings are sold for less than a thousand due to the fear of death without an earlier sale. Beekeepers also face similar challenges during the dry and rainy seasons as limited water sources and lack of blooming trees lead to bee migrations and reduced honey production. These factors contribute to low incomes for the community throughout the year.*

These findings reflect the findings of the KALRO which was investigating the economic acuity of the communities living in the areas prone to floods and droughts. The findings outline that the communities operate at a lower income than the average citizen in the Kenyan Republic.

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[102] "Chaudhry, Shazia. "The impact of climate change on human security: the case of the Mau forest complex." (2015): 390-398".

Through the study, some members of the population are defined as having a dry spell period of no income at all. The study describes this period as ranging from one month to three months in the average plainland community. The people thus are left to scavenge for food from inedible plant leaves or even animal carcasses which complicates their lives further through diseases and infections[103].

4.8 Chapter Summary

In this chapter of the study, the study revealed a complex interplay between climate change and human security, with climate change exacerbating existing security threats, particularly in vulnerable communities such as those living in Tsavo Conservation Area. These findings have significant implications for policy and practice and can inform the design and implementation of climate change mitigation and adaptation programs in Kenya and other vulnerable regions worldwide. The next chapter gives a summary of the findings, with inferred conclusions and recommendations based on the study objectives.

[103] "Murungi, Edwin, Ednah Masila, Irene Ogali, Nathan Langat, Ruth Onywera, Vincent Malonza, Christine Inguyesi, Frank Onyambu, Hezron Wesonga, and Monicah Maichomo. "Draft Genome Sequence of Streptococcus agalactiae KALRO-LC1 Strain Isolated from a Mastitis-Infected Camel in Laikipia County, Kenya." *Microbiology Resource Announcements* 11, no. 10 (2022): e00910-22".

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter sets out to give a summary of the findings of the study as well as make valid conclusions from these findings. In addition, the chapter outlined a few recommendations that can be applied by policymakers and leaders in the improvement of human security by addressing climate change issues.

5.2 Summary of the Study Findings

The study findings are summarized along with the study objectives as outlined below:

5.2.1 Profile of Climate Change in Tsavo Conservation Area

The study revealed that there had been variations in temperatures**,** severe and extended periods of drought, a shift in highly unpredictable weather patterns, ecological disruptions such as vegetation, an increase in wildfires during dry seasons that were uncommon in the past, increase in heat waves. The study also found that both natural factors including, solar variability, wildfires, and ocean currents were drivers of climate change. In addition, human activities including, agricultural practices, burning of buildings, consuming excessively, burning fossil fuel, and logging/deforestation were also causing climate change.

5.2.2 Human Security Concern

The study revealed that there were prevalent human security concerns in the Tsavo conservation area that to a great extent had been affected which included, food security, water security, human

displacement and migration, economic security issues, human versus animal conflicts, health security, and cultural/ social security concerns.

5.2.3 Climate Change and Human Security Nexus

The study revealed that climate change had direct and indirect consequences on human security. The study revealed that climate change had resulted in reduced food availability leading to food shortages and price increases, and affected crop yields leading to food shortages and price increases. Climate change has also led to displacements or loss of livelihoods due to climate change has reduced food availability to communities. Climate change has also led to an escalation of climate change-induced mortality through floods and droughts, air pollution, and other environmental health risks. Increased conflict due to an increase in water scarcity, increased conflict due to difficulties in accessing food. Climate change has also led to a rise in Agro-pastoral conflicts due to limited access to water and pasture. Besides, climate change has led to human-wildlife climate-related conflicts, cultural erosion (change in lifestyles), forced migration and displacements due to climate change, and a reduction in income.

5.3 Conclusions

5.3.1 Climate Change Profile

The research concludes that the drivers of climate change include the continuous emission of greenhouse gases, deforestation, severe droughts, and extreme weather conditions. Tsavo Conservation Area is particularly vulnerable to the changes in climatic conditions with the exponentially rising trends of drought will continue to jeopardize water, health, food, and cultural and personal security.

5.3.2 Human Security Concerns

The study concluded that the Tsavo conservation area had a fair share of human security challenges which included, health security, food security, water security, cultural security, economic security, social security, and environmental security (biodiversity and ecological security), which defined different aspects of human security threats. The situation therefore requires immediate address through various mechanisms. The conclusions are in support of the human security theory which advocates for preventive and intervention mechanisms to address security issues through education, poverty eradication, health care services, and end environmental conservation to address future threats. Human security theory advocates for internal cooperation and responsibilities in addressing human security through borderless support to vulnerable populations.

5.3.3 Climate Change and Human Security

The researcher concluded that both climate change and human security are interlinked to one another in such a way that the changes in climatic conditions influence the water quality and availability, food availability, health, environment, and economic aspects, which are vital to the existence of human beings. Catastrophic devastations of climate change on human insecurities are deeply felt in vulnerable areas like Tsavo. Climate change is likely to exacerbate owing to population pressure, and the unavailability of essential resources which are recipes for persistent tensions and conflicts.

The conclusions are in support of the human security theory whose arguments are that human security should be broad enough to address the human well-being of hunger, diseases, political violence, and environmental degradation. The theory also is individual-centered, keenly focusing

on individual security and societal security as paramount to the state's security and interests. The human security theory is also interconnected in such a case that one security threat like poverty can lead to food insecurity which can in turn lead to conflicts and people displacement.

5.4 Recommendations

5.4.1 Climate Change Profile in Tsavo Conservation Area

The Kenya Wildlife Department should conduct a comprehensive climate assessment in the Tsavo conservation area to understand the vulnerability and potential effects of climate change in the area. The exercise should involve gathering data on precipitation patterns, temperature trends, and frequencies of extreme weather in the region. It is also important for climate experts to analyze historical data on climate patterns and project future scenarios within the Tsavo conservation area. Lastly, it is important to have a collaboration between the climate scientists, and the local experts for a comprehensive understanding of the climate change within the Tsavo conservation area.

Kenya Wildlife should collaborate with the government and the local communities in the development of a comprehensive strategy that reduces gas emissions. There should also be initiatives to promote the use of renewable sources of energy such as solar energy to reduce emissions from the area. Kenyan wildlife should also encourage the planting of trees for reforestation in areas where there has been logging, the effort will enhance the sequestration of carbon emitted from the burning of forests and carbon-related products, ultimately leading to the enhancement of local biodiversity. Both local government and National governments need to launch outreach and education campaigns to create awareness of the importance of sustainable practices that preserve the environment and ultimately climate resilience.

5.4.2 Human Security

The study recommends that the Ministry of Wildlife and Tourism conduct a thorough assessment of the human security within the Tsavo Conservation Area where it should be tailored towards looking at issues such as clean water accessibility and availability, food security, economic and health well-being of the community people living in the area. Human security threats should also be identified particularly, the ones that have been exacerbated by climate change. It is also important for the wildlife service to engage with the local communities and the local experts to gather insights on the vulnerabilities and the challenges encountered by the communities living within the Tsavo conservation area.

Local governments and the National government through the Ministry of Agriculture should support sustainable agricultural practices such as conservative farming and agroforestry to enhance agricultural productivity and food security in the area. Additionally, local communities should turn to cultivating drought-resistant crops to promote food security and resilience to the climate conditions. Besides relevant authorities including the Ministry of Agriculture should address potential conflicts related to resource scarcity by promoting sustainable land usage and resource management. Local communities should also implement water harvesting techniques that ensure reliable water supply.

Similarly, both governmental and non-governmental entities should scale up the support of sustainable livelihoods in the Tsavo Conservation Area by providing training and support for entrepreneurial activities and improving access to markets for agricultural products. This will promote economic growth by offering alternative job opportunities to the people who have already lost their livelihoods to climate change.

5. 4.3 Climate Change and Human Security

The study recommends the adoption of sustainable agriculture in the Tsavo Conservation Area by supporting sustainable agricultural techniques, such as conservation farming practices, rainwater gathering techniques, planting drought-resistant crops, and promoting agroforestry. This will help to ensure food security, increase agricultural productivity, and build resilience to the impacts of climate change.

The study recommends the empowerment of local institutions and promoting community-driven solutions in the Tsavo Conservation Area by facilitating the growth of grassroots organizations and community-based initiatives that can help raise awareness and build resilience to the impacts of climate change at the local level. Additionally, county officials should be encouraged to play a more dynamic role in supporting and promoting sustainable practices and policies that help to reduce greenhouse gas emissions and promote environmental sustainability. Local institutions need to collaborate with international organizations such as the United Nations to leverage their insights on climate change mitigation practices to improve human security within the Tsavo Conservancy area. Additionally, local governments should enhance cooperation with the NGOs, and local communities to ensure the well-being of the communities in the face of the impacts of climate change.

Formulation and application of mitigation and adaptation efforts that take care of human security initiatives, such as poverty reduction, conflict resolution, and health measures. There should also be an address of the environmental socio-economic aspects to ensure a favorable connection between climate change and human security. Lastly, there should also be contingency

plans that address potential climate-induced threats to human security such as food security, water security, and displacement of people.

5.5 Areas for further studies

As a contemporary and growing subject, the effect of climate change on human security needs additional investigation. There is a need to carry out further research on the relationship between climate change, biodiversity, and human security especially in wildlife-protected areas of Kenya.

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APPENDICES

Appendix I: Survey Questionnaire

Dear respondent,

My name is Jane Franciscah Wamboi and I am researching climate change and human security in Tsavo Conservation Area, Kenya. The results obtained from the study will be instrumental in improving human security in Kenya. This research is being undertaken as a part of the requirements for the award of Masters degree in National Security and Strategy at the National Defence University, Kenya. The information you provide will aid in meeting the objectives of this research. The information will be handled with utmost confidentiality. I kindly request you answer the questions with entire sincerity by ticking (fill in) the boxes as required.

SECTION A: Bio Data of Respondent

Q1. Kindly specify your gender

i. Male ( )

ii. Female ( )

Q2. Indicate your age bracket.

(i) 18-25 years ( )

(ii) 26-33 years ( )

(iii) 34-41 years ( )

(iv) 42-49 years ( )

(v) 50 and above ( )

Q3. Kindly tick the education level you have.

(i)High school ( )

(ii)Diploma ( )

(iii) Bachelor's Degree ( )

(iv) Master's Degree/Postgraduate Diploma ( )

(v) PhD Level ( )

(vi) Other (indicate) ----------

Q4. What Agency or institution are you a member of?

i. Government ( )

ii. NGO ( )

iii. Research Institute ( )

iv. Community ( )

v. Other (indicate) …….

Q5. How long have you worked in the climate change sector/space

(i) Below 5years( )

(ii) 5-10 years( )

(iii) 10-15years( )

(iv) Above 15years( )

SECTION B: CLIMATE CHANGE IN KENYA

Q6. Are you aware of climate change in Tsavo Conservation Area? Tick appropriately

Yes ( ) No ( )

Q7. What climatic changes have you witnessed in TCA during the time you have been living in this area?

……
……
……
……

Q8. Concerning climate change issues in Kenya, what degree or level do you agree with the following statements? Tick where appropriate using the following scale: 1= Strongly disagree, 2= Disagree, 3- Neither agree nor disagree, 4= Agree, 5= Agree Strongly

Statement	1	2	3	4	5
Knowledge/Awareness of Climate Change					
Climate change has resulted in fluctuation in earth's temperatures in Kenya					
Severe and prolonged droughts are common in Kenya					
Severe floods are common in Kenya					
The pattern of weather in Kenya is generally changing					
Fires are common during the dry season					
Climate change threatens people's security and survival					
Causes of climate change					
Human activity is responsible for climate change					
Habitat degradation/Deforestation is one of the major causes of climate change					
Changes that occur naturally within the atmosphere are responsible for climate change					
Intensive farming (crop and animal) is a major contributor to climate change					

SECTION C: HUMAN SECURITY CONCERNS

Q9. Has there been a disappearance or change in the availability of some food that used to be there in the past?

Yes ( ) No ( )

Q 10. Are there challenges related to food like a shortage

Yes ( ) No ( )

Q11. Are there changes in water quality and availability that were not there in the past?

Yes ( ) No ( )

Q12. Are there challenges to health within your community now that were not there in the past?

Are there certain diseases you can mention that are prevalent now but were not there in the past?

……

……

Please rate the extent to which the following human security concerns are prevalent. 1= No extent, 2= little extent, 3- Moderate extent, 4= Great extent, 5= Very Great Extent

	Statement on Human Security Challenges	1	2	3	4	5
Q13.	There has been a reduction in job opportunities compared to the past in my area.					
Q15.	There have been changes in the migration patterns or displacement that were not there in the past such as people moving toward the wild areas					
Q16.	There are conflicts related to resource competition in my area that were not there in the past					
Q17.	There has been the disappearance of animals, plants, fruits, or trees that were so common in the past					
Q18.	There are some cultural practices our community has dropped at some point due to changes in the climate					

Q19. From your observation, would you say Human Security in TCA has declined over the years you have been in this area?

Yes ( ) No ( )

Please explain your answer
……..……
……
……
……

Q20. Would you say that the climatic changes mentioned above (Q9) have influenced Human Security in TCA?

Yes ( ) No ( ).

Please explain
……
……
……

SECTION D: CLIMATE CHANGE AND HUMAN SECURITY IN TCA, KENYA

Q21. Concerning climate change and human security nexus in Kenya, to what level do you agree with the following statements? Tick where appropriate using the following scale: 1= No extent, 2= Small extent, 3- Moderate extent, 4= Great extent, 5= Very Great Extent

Assertions	**1**	**2**	**3**	**4**	**5**
Impacts of Climate Change on Food Security					
Climate change has reduced food availability leading to food shortages and price increases					
Climate change has affected crop yields leading to food shortages and price increases					
Communities are facing decreased food availability as a result of displacements or loss of livelihoods caused by climate change.					
Climate change has affected food quantity, and diversity, leading to malnutrition and health issues, especially in vulnerable communities.					
The Influence of Climate Change on Health Security					
Climate change-induced mortality due to floods and droughts is on the rise in Kenya.					
Climate change has intensified the mental disorder burden in Kenya through livelihood loss.					
Climate change has led to air pollution and other environmental health risks.					
Impacts of climate change on conflict and individual security					
Water scarcity caused by climate change has resulted in heightened conflict levels.					
Food access challenges resulting from climate change have contributed to a rise in conflict.					
Climate change has led to a rise in Agro-pastoral conflicts due to limited access to water and pasture					
Climate change has led to human-wildlife climate-related conflicts					
Effects of Climate Change on Water Security					
Communities are experiencing insufficient availability of water due to the impacts of climate change.					
Climate change has resulted in less than enough water being available during the rainy season					

Climate change has resulted in less than enough water being available to wildlife and livestock leading to conflicts over water resources					
Climate change has led to the availability of poor-quality water to most community members leading to the spread of water-borne diseases					
Effect of Climate Change on Economic and Cultural Security					
Climate Change causes cultural erosion (change in lifestyles)					
Forced migration and displacements due to climate change are more rampant					
Climate change causes a reduction in income					

Q22.In what ways have you seen climate change influence human security in TCA?

(i)Food security ( ) (ii) Water security ( ) (iii) Economic security ( )

(iv) Cultural security ( ) (v) Health security ( ) (vi) Other, specify…….

Q23. Would you say that your work has been impacted by climate change? Please elaborate on your
answer……
……
……
……

Q24. In your opinion, do you think human security could be improved if climate change issues are addressed? Please explain.

……
……
……
……

Appendix II: Key Informant Guide

1. What is your position in this institution/ organization?
2. How long have you worked in this institution?
3. Have you witnessed any climatic change aspects in this area? If yes, kindly state them.
4. How has the aspect of human security changed over time in the Tsavo Conservancy area? Kindly describe.
5. How has Climate change influenced your life and that of the surrounding community?
6. In which ways do you think Human Security has been influenced by changes in the climate?
7. Are there human security concerns in the Tsavo Conservancy area, if so which are they?
8. Do you think that climate change has any significance on human security in this area?
9. What effects does climate change have on the security of the members of this community?

Appendix III: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **677009**

Date of Issue: **06/December/2022**

RESEARCH LICENSE

This is to Certify that Ms.. Jane Franciscah Wamboi of National Defence University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Makueni, Taita-Taveta on the topic: Climate Change and Human Security in Tsavo Conservation Area, Kenya for the period ending : 06/December/2023.

License No: **NACOSTI/P/22/22245**

677009

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions

Appendix III: introduction Letter from National defence College

RESTRICTED

Telephone: 254-2-884036
Fax: 254-2-884036
E-mail: ndc@ndc.go.ke

When replying please quote:

Ref: NDC/A/141

National Defence College
Warai North Road
P.O Box 24381
Karen - Nairobi
Kenya

10 November 2022

TO WHOM IT MAY CONCERN

FACILITATION FOR MS JANE FRANCISCAH WAMBOI ADMN No. ND601/0028/2022

The above Senior Officer is a course participant at the National Defence College and has been admitted for Masters of Arts in National Security and Strategy, under the National Defence University- Kenya Programme.

As part of academic requirements, MS Jane Franciscah WAMBOI is required to undertake a research project in partial fulfillment of MA degree programme she is enrolled in. Her approved research topic is **"Climate Change and Human Security in Tsavo Conservation Area, Kenya".**

The purpose of this letter is to kindly request your office to facilitate the Officer as she conducts her research project.

Submitted for your kind consideration and facilitation.

Mr F M MABEYA
Head of Programme