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INSTITUTE OF DIPLOMACY AND INTERNATIONAL STUDIES

M.A. RESEARCH PROJECT

THE IMPACT OF CLIMATE CHANGE ON HUMAN DEVELOPMENT: A CASE

STUDY OF KENYA

BY

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DECLARATION

I, **Anne Kaari Muthamia**, hereby declare that this thesis is my original work and has not been presented for any award of diploma or degree in any other University.

Signature.....Date.....

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This project has been submitted for examination with my approval as University Supervisor.

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DEDICATION

I dedicate this project to my late brother Stephen Mugambi, who went to be with the Lord during the course of my studies.

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ABSTRACT

Climate change affects achievement of Kenya's human development goals of providing basic necessities to all its citizens. This research therefore examines the extent of influence and impact of climate change on human development and the interventions put in place by the Government of Kenya to tackle these challenges. This research set to find out how climate change impacts human development in Kenya, how Kenya has responded and the major challenges to building resilience. The research utilized systematic review of literature and qualitative research was applied in data collection using expert interviews and questionnaires. Literature review gives an in-depth analysis of climate change trends globally, regionally and nationally and reviews the major policies, agreements and legislations that guide this discourse. The study gives a detailed description of human development and narrows to an analysis of Kenya Human Development Index as described by the United Nations Development Program. The factors that impact human development in Kenya are analysed and these include food security, human security, land tenure system, development planning, and gender among other factors. The third chapter reviews Government of Kenya role in enhancing human development through climate change mitigation and adaptation measures is interrogated. This includes a review of all existing policies and laws and international agreements and treaties to which Kenya is a party to and that govern climate change in the country. Interventions being undertaken by the key government Ministries to tackle climate change through various policies, laws, strategies and plans have been analysed. In particular, the research reviews the six key sectors the Government of Kenya has identified in tackling climate change and these are Environment, Agriculture, Energy, Water, Lands and Transport. These are the six sectors that have been identified to have the highest impact in resolving climate change in Kenya due to their contributions in carbon emissions, and ability to impact human development in the country. Interestingly, the research reveals that Education is a key sector in tackling climate change and promoting human development, yet it has been omitted as a priority sector. The green theory has been utilized to analyse and explain the choices made by policy makers in Kenya's government. This study uses qualitative design in its conduct and data findings from expert interviews and key informants working in the field of climate change in the country are presented as well as findings from administered questionnaires. The research findings reveal that education is the most critical requirement for addressing the impact of climate change on human development in Kenya. Agriculture is identified as the most severely affected by climate change, however the Climate Change legislation is viewed as adequate for addressing identified challenges. Key measures that are recommended by respondents include enforcement of regulations, allocation of funds, and introduction of carbon taxes, community sensitization, and adoption of green energy among other interventions. The last chapter gives recommendations which include incorporating climate change studies in schools curriculum and public awareness and education, offering incentives and benefit sharing, alternative energy, and gender inclusion among other recommendations. Education of stakeholders as well as public awareness through various platforms including social media is viewed as the most effective method to tackle climate change and enhance human development. The Energy sector is also considered as the second-most critical sector in tackling climate change to enhance human development.

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 INTRODUCTION

The world court unequivocally tasks States to exhibit prudence and conserve its natural global endowment, the environment. This has been developed according to the United Nations' dedication to assimilate environment and development in achieving enduring socio-economic progress.¹

Scientists have begun to give sketchy proof of anthropogenic climate change since the late 19th century, but the strongest indication of man's impact on the world's environment emerged post World War II, when researchers at the Scripps Institution of Oceanography started to quantify icebergs in North Pole and South Pole. The research revealed that earth's concentrations of CO₂ were increasing and connected the increase to a rise in atmospheric temperatures. Consequent decades led to a wave of studies about the changing environment.

The findings grew in importance in the 80s after the launch of the Brundtland Report popularly referred to as "Our Common Future". The document referred to assorted environmental challenges, most notably, climate change. Concerned with this, the Intergovernmental Panel on Climate Change (IPCC) was formed in 1989 to give comprehensive unbiased findings on climate change, the impact, anticipated threats, and propose alternative for adjusting to survive and reduce its effects.²

In 1992, an excess of 100 world government leaders conveyed in Rio de Janeiro for the Earth Summit a conference organized by the United Nations. This led to the emergence

¹ Regina S. Axelrod and Stacy D. VanDeveer, 2015. *The Global Environment Institutions, Law and Policy*. (Sage Publications, 2015). 4th Ed., United Kingdom, p. 53.

² <http://www.ipcc.ch/about> Intergovernmental Panel on Climate Change website. Accessed on 20/8/2017

of the UN Framework Convention on Climate Change (UNFCCC) alongside biodiversity conventions, policies to address desertification and notably important international environmental governance guidelines and visions.

UNCED represents the first time that all world nations meet without consequences or threats of war or without a major economic crisis. With the signing of the UNFCCC by one hundred and ninety two countries, the globe commenced on tackling effects of international climate by reducing emissions of Green House Gases (GHGs).

On the continental platform, in 2011, African Union embraced a home-grown strategy, while East African Community, adopted policies on climate change, strategies and general plans. The strategic visions outline important interventions in East Africa, which guide national policies and strategies on climate change in member states. The Kenya climate change action plan, is guided by UN and African continent commitments.³

Since independence, Kenya has been developing gradually towards achievement of enlarging people's freedoms and opportunities and improving their well-being. The economy of the nation has grown steadily over the decades, and notable milestones have been made in diminishing gender gaps, enhancing growth of the economically disadvantaged, improving access to clean environment, enhancing fairer contact to vital requirements, safeguarding individual rights, and appreciating citizens' aspirations. Kenya's Human Development Index (HDI) is above most African countries.

Regardless of the achievements, numerous obstacles still hamper fair and sustained human development. One particular risk if not adequately, thoroughly and persistently

³ Kenya National Climate Change Action Plan. 2013. Government of Kenya. Ministry of Environment and Natural Resources. p. 10.

handled, will aggravate matters is climate change.⁴ The UN Framework Convention on Climate Change (UNFCCC) defines climate change as "a climate change assigned directly or indirectly to human activity that changes the composition of the global atmosphere and adds to the natural climatic variability observed in comparable periods."

Kenya, has in the recent past been a victim of climate-related phenomena: prolonged droughts, frost in some of the fertile agricultural regions, hailstorms, extreme floods, recoil of the lake, drying of inland water bodies, among others resulting in considerable economic losses and straining Kenya's food security. The detrimental effects are exacerbated by localized environmental degradation, mainly prompted by habitat destruction and conversion, pollution, deforestation and overgrazing.⁵ Conventional resource management policy structures and strategies are generally centered on reductionist approaches within the paradigm of a sole discipline with strategies that are reactive, fragmentary with unsatisfactory management outcomes.⁶

The Government of Kenya has come up with the 2010 National Climate Change Response Strategy (NCCRS) and the National Climate Change Action Plan 2018 - 2022. Vision 2030 is a development layout which seeks to transform Kenya into an industrialized nation with average income that provides appropriate livelihoods for all its citizenry in a hygienic and safe environment through 2030.⁷

⁴ United Nations Development Programme, *National Human Development Report- Climate Change and Human Development*. (UNDP Kenya, 2013). p. vi.

⁵ Kenya National Climate Change Action Plan. 2013. Government of Kenya. Ministry of Environment and Natural Resources. p. 3-4.

⁶ B.M. Campbell and J.A. Sayer. 2007. *Integrated Natural Resource Management. Linking Productivity, the Environment and Development*. (CAB International.) p. 66.

⁷ Government of Kenya. 2007. Kenya Vision 2030. Nairobi. The Government of Kenya. p. vii.

Obtaining long -lasting financial progress past the 2030 vision for climate change is a major priority. Kenya is already at risk to climate induced catastrophes such as droughts and floods. Nonetheless, the country's expanding citizenry and financial system along with urbanization have the potential to increase struggles over natural assets, and increase the country's susceptibility to environmental changes.⁸ In the medium term, the Government has unveiled the Big Four Agenda 2018-2022, and it includes enhancing food security which can only be achieved through favorable climatic conditions.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Kenya is striving to achieve Sustainable Development Goals (SDGs) through the Kenya Vision 2030 and other Medium -Term development blueprints. Currently, the Government of Kenya is implementing Medium Term Plan III (MTP III) 2018 - 2022, under which it has prioritized the Big Four Agenda. This includes enhancing food security, provision of universal healthcare, provision of adequate housing and growing the manufacturing sector. The ultimate goals is to provide a good standard of living for all Kenyans while developing Kenya into a middle income, highly industrializing and developing economy. However, various challenges impinge achievement of these development goals and key among this are the challenges presented by climate change.

Effects of climate change such as unpredictable weather patterns, natural disasters such as floods and drought have been hampering the projected 10 per cent per annum GDP growth. This is because resources are diverted to deal with effects of climate change, hence

⁸ Government of Kenya. 2013. National Climate Change Action Plan. Ministry of Environment and Natural Resources. pg. 1.

slowing down economic targets. Such challenges include displacement of populations due to flooding, resources to cater for internally displaced communities, rehabilitation and reconstruction of destroyed infrastructure, funds to deal with outbreak of diseases such as cholera, funds to implement crop and livestock insurance schemes among other interventions.

Vision 2030 social pillar includes providing free primary and secondary school education. Climate change leads to closure of schools due to floods and drought/ famine particularly in ASAL regions. Climate change has therefore affected the achievement of Kenya's human development goals of providing basic necessities to all its citizens. This research examines the extent of influence and the effects of climate change on human development and interventions put in place by the Government of Kenya to tackle these challenges.

1.3 RESEARCH QUESTIONS

- i. How does climate change impact human development in Kenya?
- ii. Has Kenya adequately responded with climate change adaptation and mitigation measures to enhance human development in the country?
- iii. What are the major challenges posed towards creating resilience against climate change and human development in Kenya?

1.4 OBJECTIVES

The broad objective of this research study is to assess the relationship between human development and climate change in the country, examine the interventions being undertaken and the challenges posed to mitigation and adaptation measures for sustainable development that have been adopted by the Government of Kenya.

This research will seek to:

- i. Understand the interaction between climate change and human development in Kenya.
- ii. Examine the approaches for building resilience towards climate change in order to enhance human development in Kenya.
- iii. Study the challenges posed to mitigation and adaptation measures for sustainable development that have been adopted by the Government of Kenya.

1.5 LITERATURE REVIEW

This section will review literature from books, reports, policy documents and legislations by various authors, United Nations, Government of Kenya and International Organizations as pertains climate change and human development with particular emphasis on Kenya. The literature to be reviewed will assist to give an overview of the phenomenon of climate change in general and its impact particularly in Kenya. The sections will examine literature on global, regional and national developments as pertains climate change and human development.

1.5.1 Climate Change: An Overview

Climate change is undoubtedly a critical security concern for states, with many of the opinion that the rising global temperatures and resultant climate change will likely result in social instability and violent conflicts.⁹ According to the Intergovernmental Panel on Climate

⁹ Barnett Jon, and W. Neil Adger. (2007). "Climate change, human security, and violent conflict," *Political Geography* 26. pp. 639 -655.

Change (IPCC), there is widespread understanding that climate change is the source of many kind of rapid environmental phenomena: soil desiccation and desertification, sea level rise and coastal flooding and erosion, more intense storms, loss of biodiversity and extinction, and extremes of hot and cold. These impacts have gained the attention of government security and intelligence branches, such as the U.S. Department of Defense.¹⁰

Climate change can be interpreted as a global environmental problem. Its causes, effects, and solutions cut-across state boundaries, creating a need for global cooperation. Political and ethical questions remain regarding who bears responsibility for mitigating the threat. Although industrialized countries emitted the vast majority of GHGs in the past, some developing countries are among the largest emitters today. In 2007 China surpassed the USA as the global leader in the emission of GHGs. In addition, climate change is linked to the global energy system and reducing emissions is likely to affect the cost and access of energy, a core component of the global economy.¹¹

The Center for Naval Analysis (CNA) comprising climatological experts and U.S. military officers made a report in 2014 which concludes that in spite of the uncertainty over specific causes and consequences of global warming, the changes already and will continue to foment civil instability. These developments will contribute to state failure, international conflict, regional strife in historically unstable regions, and even terrorism and genocide.¹²

¹⁰ M. Troy Burnett, *Natural Resource Conflicts From Blood Diamonds to Rainforest Destruction*, vol. 1 (ABC - CLIO, LLC USA, 2016) p. 70.

¹¹ Regina S. Axelrod and Stacy D. VanDeveer. 2015. *The Global Environment Institutions, Law and Policy*. (Sage Publications. 4th Edition. United Kingdom). p. 234.

¹²Center for Naval Analyses Advisory Board (CNA). 2014. National Security and the Accelerating Risks of Climate Change." Washington, DC: CNA Analysis and Solutions, U.S. Department of Defense. Editor M. Troy Burnett p. 73.

Analysis of paleo climatic data correlated with historical records of warfare around the world between 1400 and 1900 suggests substantial association of temperature change with frequency of war. Energy efficiency has never received much thought in warfare. The United Kingdom's Green Party approximates that the USA, Britain, and the minor parties of the "coalition of the willing" burned an equal amount of fossil energy in the Iraq war (40,000 barrels a day) as the 1.1 billion citizens of India. The Iraq war contributed more greenhouse gases to the air than more than half of the entire world emissions.¹³

1.5.2 Impacts of Climate Change

Human development is a course of action to increase the citizens' options and improves people's untapped potential and rights, facilitating them to: enjoy a prosperous life; obtain knowledge and a good socioeconomic class, and be involved in daily activities of their commune and choices touching their lives. The key scope of human development can develop gradually and varies both athwart and inside countries. Some of the subject of a talk currently regarded as the most important to human development includes social advancement, effectiveness, impartiality, involvement, liberty, durability and human security.¹⁴

In 1990, UNDP initiated the first report on human development and, in its confines, the human development index (HDI). Afterwards, the Human Development Reports (HDRs) were generated almost annually. Relationships apply the notion of human development to various issues such as environment, gender, poverty, globalization, human security,

¹³ Zhang Davd D., Peter Brecke, Harry F. Lee, Yuan-Qing He, and Jane Zhang. (2007). "Global Climate Change, War, and Population Decline in Recent Human History." Proceedings of the Academy of the National Academy of Sciences, 104(19), 214-219. Article by Bruce E. Johansen, Editor M. Troy Burnett p. 74

¹⁴ Human Development and capability association reports website <http://hdr.undp.org>. pg. 1-2.

economic growth, poverty eradication, globalization, new technologies, human rights, deepening democracy, Millennium Development Goals (MDGs), international cooperation, water scarcity, cultural liberties and migration.

Consequently, the 2012 HDI for Kenya is 0.522, an upgrade from the preceding year's score of 0.509. This result is above the standard for Sub-Saharan Africa. Notwithstanding the achievement, Kenya's HDI and world standards aggravated from the 1980s.¹⁵ Kenya's HDI has only recorded modest growth in the last four decades, starting at 0.420 in 1980 to 0.520 in 2012. The country is evaluated in a United Nations world assessment on welfare and living standards over annual financial development levels.

The HDI report by the UNDP positioned Kenya number one hundred and forty five from a total of one hundred and eighty seven countries. The survey still points out an increase in the HDI in Sub-Saharan Africa from 0.0366 to 0.475 over four decades, hence Kenya is performing better than most African states.¹⁶ Other UNDP HDI reports on Kenya have focused on the following thematic areas: gender and poverty (1999), social and economic inconsistencies (2001), participatory governance (2003), human development outcomes of industrialization (2005), human security (2006), youth development (2009) and climate change (2013).

From the Peace treaty of Westphalia in 1648, the prevalent security focus was to protect territorial boundaries of a state from armed aggression. The paradigm of human

¹⁵ United Nations Development Programme. National Human Development Report. Climate Change and Human Development. (UNDP Kenya). 2013.p. vi.

¹⁶ Ibid. p. 11.

security moves the focus from land towards the citizens that live in the country and imminent threats to their well-being and progress.¹⁷

Citizens are the true riches of countries. The fundamental goal of enhancing socio-economic progress is to allow citizenry to prosper in different and innovative ways. This may seem apparent however in a rush to spur growth, it is often ignored. Human development emphasizes the core importance of people in a nation's progress.¹⁸

Human security has become critical in the 21st century as a means to ensure lasting peace and security, the development of an individual needs to be guaranteed. Emerging issues that will be addressed in human development are achievement of Sustainable Development Goals (SDGs), terrorism, globalization, economic uncertainties, immigration, rapid population increase, human rights, climate change among others. This paper will focus on climate change and the influence it has on Human Development.

Dimensions of Human Development mentioned in different reports include health and life, education, decent standards of living, political freedom and process freedom, productivity and creativity, civil and political rights and good physical environment.¹⁹ In addition, deforestation, desertification, loss of ecosystems, ozone depletion, obligation to safeguard the environment through financial progress and the uneven results of ecological

¹⁷ Oxford Poverty & Human Development Initiative. 2010. Oxford Department of International Development. University of Oxford. UK. p. 36.

¹⁸ Ibid. p. 23.

¹⁹ Oxford Poverty & Human Development Initiative. 2010. Oxford Department of International Development. University of Oxford. UK. p. 9.

destruction on the vulnerable have been critical issues or have obtained notable attention in eleven of the previous world reports.²⁰

Global warming is also forcing forward-thinking military strategists to question the military's role in shaping its position toward assistance in natural disasters that produce large numbers of climate refugees who need assistance with basic survival. Reports to the government have warned that effects of global warming could provoke increased migration, heightened tensions across borders, spread of diseases, and intensifying conflicts over food and water.

The actions of the United States and the international community have not been sufficient enough to cope with the challenges posed with climate change. Climate change poses as a catalyst for conflict in vulnerable regions of the globe, and predicted shifts in global migration patterns will make challenges more acute.²¹ Pastoralism features in arid and semi-arid regions where mobility, ecological knowledge and seasonal pastures provide effective management of environmental risk. Today endemic physical threats -drought, plant growth, water, temperature, and precipitation patterns are exacerbated by climate change and global warming - new factors that disrupt livelihoods and can contribute to conflict in pastoral communities.²²

The Pentagon's Quadrennial Defense Review, issued in March 2014, made a notable emphasis on extreme weather's role as a "threat multiplier" in destabilizing societies in ways

²⁰ Oxford Poverty & Human Development Initiative. 2010. Oxford Department of International Development. University of Oxford. UK. p. 13.

²¹ ²¹ M. Troy Burnett, *Natural Resource Conflicts From Blood Diamonds to Rainforest Destruction*, vol. 1 (ABC -CLIO, LLC USA, 2016) pp. 67 - 69.

²² M. Troy Burnett, *Natural Resource Conflicts From Blood Diamonds to Rainforest Destruction*, vol. 1 (ABC -CLIO, LLC USA, 2016) p. 35.

that increase the appeal of ideologies that inspire acts of terrorism. In Mali, where the Sahara Desert is spreading and devastating agriculture, contributes to a jihadist uprising. By 2014, Al Qaeda had seized much of northern Mali. The Pentagon's reports link national security to climate security. The Pentagon also has recognized climate change as a national-security threat, found it useful for seeking an increase in defense expenditure.²³

The process of developing a coordinated global response to the changing climatic conditions lays emphasis on the Framework Convention on Climate Change (FCCC), Kyoto Protocol and the Cancun Agreements. The first two treaties outline values, practices, regulations, and executive processes that guide relations among members of the global population. The Cancun Agreements have tried to build up original rules and institutions within the present regime to address the changing nature of climate change. In the UN context, countries have primary decision-making authority, but NGO representatives can participate as observers and provide input in the diplomatic process.²⁴

At the regional level, Africa has been categorized as the region highly prone to the consequences of anticipated climate change on agriculture, human health and other sectors, mostly due to prevalent poverty is anticipated to hamper adaptation capabilities.²⁵ Scientific proof reveals that Africa's climatic temperatures are increasing, a trend that is likely to persist. Subsequently, because Africa is a huge continental mass, the climatic effects are very different depending on the position on the continent. Specific regions in Africa will turn out

²³ M. Troy Burnett, *Natural Resource Conflicts From Blood Diamonds to Rainforest Destruction*, vol. 1 (ABC - CLIO, LLC USA, 2016) pp. 68 - 69.

²⁴ Regina S. Axelrod and Stacy D. VanDeveer. 2015. *The Global Environment Institutions, Law and Policy*. (Sage Publications. 4th Edition. United Kingdom). p. 238.

²⁵ IPCC (Intergovernmental Panel on Climate Change). 2001b. Climate change 2001: the scientific basis. Working group 1 contribution to the IPCC Third Assessment Report. (online) URL: <http://www.ipcc.ch/>

to be more prone to prolonged dry spells, whereas other regions will experience prolonged rainfall patterns.

Thirdly, Africa largely depends on agriculture as its main socio-economic activity, and is a source of employment for over 60% of the population and accounts for over 50% of GDP. Therefore, climate change will have an immediate and direct effect, in addition to that of many regions of the world.²⁶

1.5.3 Addressing Climate Change

The process of developing a coordinated international response to climate change has focused on the UN Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Paris Agreement. The first two treaties outlined the principles, norms, rules, and procedures for decision-making that govern interactions among actors in the international sphere. The Cancun Agreements have tried to develop new rules and institutions within the existing regime to counter the changing nature of climate change. In the UN context, countries have primary decision-making authority, but NGO representatives can participate as observers and provide input in the diplomatic process.²⁷

At the regional level, Africa has been projected as the continent to suffer immensely from the impacts of climate change on agriculture, human health among other things, largely

²⁶ Paul Collier, Gordon Conway and Tony Venables. *Climate change and Africa*. (Oxford University Press. Oxford Review of Economic Policy). Vol. 24, No. 2, 2008. pp.338. <http://www.jstor.org/stable/23606648>. Accessed: 22-08-2017.

²⁷ Regina S. Axelrod and Stacy D. VanDeveer. 2015. *The Global Environment Institutions, Law and Policy*. (Sage Publications. 4th Edition. United Kingdom). p 238.

due to poverty which is expected to challenge adaptation and mitigation efforts.²⁸ Evidence points at Africa warming up at a rapid rate in comparison to the world average and is likely to continue. Secondly, because Africa is a huge continental mass, the climatic effects are very different depending on the position on the continent. Some regions of the continent will become drier and others wetter. Agriculture is the principal source of livelihood in Africa, responsible for approximately sixty percent of jobs and, in some countries, over fifty percent of GDP. Therefore, climate change will cause imminent threats that also encompass other regions of the world.²⁹

1.5.4 Climate Change in Kenya

Kenya's land mass is 580,728 square kilometers, and out of this about eighty five percent is arid and semi -arid land (ASAL). Census carried out in 2009 revealed that Kenya had a population of 39 million people but in 2018 the population is estimated at 49 million. Close to seventy percent dwell in rural areas and the rest in urban centers. The ASAL areas sustain close to 30% of the Kenya's population and 70% of livestock.

Agriculture is the economic mainstay for Kenya which contributes to twenty four percent of GDP estimated to be Ksh 342 billion in 2009. In addition, agriculture supports an additional 27% of GDP estimated at Ksh 385 billion. The sector represents sixty five percent of job creation in rural settings.³⁰

²⁸ IPCC (Intergovernmental Panel on Climate Change). 2001b. Climate change 2001: the scientific basis. Working group 1 contribution to the IPCC Third Assessment Report. (online) URL: <http://www.ipcc.ch/>

²⁹ Paul Collier, Gordon Conway and Tony Venables. *Climate change and Africa*. (Oxford University Press. Oxford Review of Economic Policy). Vol. 24, No. 2, 2008. pp.338. <http://www.jstor.org/stable/23606648>. Accessed: 22-08-2017.

³⁰ Kenya National Bureau of Statistics. 2009. Kenya's population and Housing Census 2009.

Kenya's economy depends to a large extent on climate-prone sectors such as agriculture, tourism and energy.³¹ Therefore, climate change is one of Kenya's biggest obstacles to achieving the Vision 2030. The World Bank claims that low income levels and susceptibility to climate change pose imminent development obstacles for Kenya.³²

Negative effects are exacerbated by homegrown environmental destruction, mainly through habitat loss, land use conversion, pollution, deforestation and overpopulation. Kenyan tourism is crucial to enhancing the financial sector, contributing 12% to GDP. The tourism industry in Kenya is mainly based on indigenous flora and fauna that are notably prone to climate variability.

In addition, the energy sector too is heavily reliant on hydropower, which accounts for approximately fifty percent of the country's overall energy generation. This sector is affected by prolonged dry spells and unpredictable rains. The Constitution of Kenya 2010 gives a basis for the making of legislation, adaptation and mitigation policies and strategies while assuring access to an equitable ecosystem as outlined in the Bill of Rights.

Vision 2030 includes flagship programs and projects with aspects of mitigation and adaptation to climate change, including: Integrated National Transport Policy which gives transport proposals relevant to reducing carbon emissions; National policy for sustainable development in Northern Kenya and other dry areas, which emphasizes means to control effects of prolonged dry spells and strengthen livelihoods; The National Disaster Management Policy 2012 targets to enhance and maintain the resistance of communities

³¹ Mutai, C. C., S. O. Ochola, H.K. Mukiira, L. N. Gachimbi, M. Otieno, S. M. King'uyu, and S. N. Marigi. 2011. State of the Environment. Chapter 3. Climate change and variability. NEMA.

³² World Bank. 2012. Kenya Overview. Available online at <http://www.worldbank.org/en/country/kenya/overview>. Accessed 20/ 8/ 2017.

susceptible to risks; Law of coordination and environmental management of 1999; Water Law of 2002; Law and energy policy; Development strategy for the agricultural sector 2010-2020; Second 2009-2013 national environmental action plan; and, Threshold 21, a versatile simulation software to aid inclusive and comprehensive future planning for the country's development in the context of Vision 2030. The Kenyan government and other stakeholders are implementing many relevant steps to adjust to and defend against climate change.

In agriculture, there is promotion of irrigation, value addition to agricultural products, and support to drought resistant crops among other interventions. In livestock and pastoralism, there is breeding of climate tolerant animals, setting up of livestock food reserves, recording of indigenous knowledge, forewarning systems and inoculation drives.

In water resources, there is steady increase in harvesting of rainwater, monitoring of the quality of water, de-silting water bodies and reservoirs, conserving and protecting water catchment areas, promoting recycling of water, monitoring the river flows and the flood alarm. In the forestry sector, afforestation is intensifying; promoting alternative subsistence systems based on agro-forestry, promoting alternative energy sources, community forest management among others. In energy, there is promotion of alternative sources of energy such as geothermal, wind, solar and improved cooking stoves.³³

Many conceptual models of International Natural Resource Management (INRM) focus on decision making processes. Choices by communities to embrace or ignore new innovations or land use practices are informed by a variety of considerations such as incentive structures and information flows. Key to making a choice is the review of expected

³³World Bank. 2012. Kenya Overview. Available online at <http://www.worldbank.org/en/country/kenya/overview>. pg. 16. Accessed 20/ 8/ 2017.

benefits and rivaling concerns. The rural household is considered the major actors in making choices but other stakeholders in varying scales might also contribute to the choices.³⁴

1.6 KNOWLEDGE GAPS

From the foregoing, evidence shows that climate change has an undesirable effect on human development not only in Kenya but around the world. There has been little information dissemination on the role that can be played by Government in particular and society in general, to reduce the impacts of climate change on livelihoods. The UNDP has developed reports that address matters of climate change and human development in Kenya and recommendations on how to harness emerging opportunities. However, available information has not provided concrete solutions that are being proposed by the Kenyan Government to be used by County structures and majority rural settlers to tackle the effects of climate change on human development.

1.7 ACADEMIC AND POLICY JUSTIFICATION OF THE STUDY

This study will add to the body of knowledge of climate change and human development with emphasis on Kenya. The research will focus on the responsibility of the Kenyan Government, through relevant Ministries, in addressing climate change and human development. The discoveries from this study will contribute to policy framework with emphasis on providing solutions to handling climate change amongst Kenyan communities.

³⁴ B.M. Campbell and J.A. Sayer. 2007. *Integrated Natural Resource Management. Linking Productivity, the Environment and Development*. (CAB International). p 7.

The information obtained may be utilized to guide policy in the country, the region and the world. Currently, there is a distinct observable effect on the quality of life in the country, as a result of adverse climatic patterns such as prolonged drought, floods, pests and diseases.

This research has reviewed various government policies and laws formulated to confront the related challenges in climate change and human development. There exists a gap in coordination of various policies and laws that relate to climate change and human development, hence this research will analyse the legislations in the main sectors that have the most significant contribution to climate change mitigation and adaptation. These are agriculture, environment and industry and their related sub-sectors. The information obtained will be used to inform data collection from key experts and the findings will inform various recommendations.

According to Prof. Wangari Maathai, climate change will result in massive ecological and economic challenges leading to risk factors for conflict between and within countries in Africa and displacement of people in search of suitable farming and grazing lands. This situation is already being witnessed in Kenya and other African countries and adverse effects of climate change are expected to get worse if appropriate mechanisms are not implemented.³⁵

This research project has therefore analysed existing policies and legislations and interventions in the sectors outlined above with a view of identifying the connection between climate change and human development and government interventions that have been put in

³⁵ Wangari Maathai. *The Challenge for Africa: A New Vision*. William Heinemann. United Kingdom. 2009.

place to address these challenges. The findings will contribute to new knowledge, act as a future reference for Kenya, the region and other scholars around the world.

1.6 HYPOTHESES

- i. Climate change and human development in Kenya generate a negative correlation
- ii. Mitigation and adaptation measures towards climate change, if implemented, will have a positive effect on human development in Kenya

1.8 THEORETICAL FRAMEWORK

The green theory is used to explain this study. In relation to the green theory, environmental atrocities sprout when unaccountable social agents pass on environmental costs of their choices and activities to innocent third parties in situations when the affected countries lack awareness of, or contribute to, the ecological risk-generating decisions and practices. Environmental injustices also happen when upper social classes and countries exploit more than their 'just share' of the environment, resulting in environmental degradation. The main motive of green theory is therefore to diminish environmental risks worldwide and stop unjust impacts onto innocent populations.³⁶

Ultimately, green theory advocates for: acknowledgement of the enlarged moral society that is impacted by environmental risks, not only citizens but all human beings, upcoming civilizations and all flora and fauna; inclusiveness and vital discussions by citizenry and representatives of the bigger society in all environmental decision-making; a preventive design to guarantee the reduction of risks in relation to the bigger

³⁶ Robyn Eckersley. Green Theory. International Relations Theories. University of Melbourne. 2007. pp. 247-265.

society; an equal division of those risks that are tentatively acceptable through democratic processes; and, rectifying and reparation for those countries who bear the impacts of ecological challenges.

The Bruntland Report by the World Commission on Environment and Development (1987) outlined the opportunities for economic growth and sustainable development by pursuing an environmentally friendly and sustainable development path. An extensive strategy of long-term development was approved at the Earth Summit in Rio de Janeiro in 1992, and it continues to serve as the main discourse for environmental law and policy. However, critics argue that not all environmental protection measures such as biodiversity protection are necessarily appropriate for financial growth, hence complex political trade-offs are vital.

No existing solution, despite it being theoretically perfect, can enhance global de-carbonization without adequate institutional and political backing. This calls for collective action to enhance existing political momentum rather than vouch for solutions that do not support continued industrialization. Confronted by the reality of a climate changed world, green theorists need to adequately rethink how they view the connection between technological innovation, global development and environmental change in ways that would appreciate the diversity and pluralism of modern societies.³⁷

The Green theory does describe the impact of climate change on various populations, looks at challenges being faced by developing countries and gives

³⁷ Robyn Eckersley. Green Theory. International Relations Theories. University of Melbourne. 2007. pp. 247-265.

recommendations for mitigation and adaptation. Therefore it is best suited for this particular study.

1.9 RESEARCH METHODOLOGY

This study adopted qualitative design in its conduct and utilized descriptive research design. Descriptive research design is a scientific method which involves observing and describing behaviour of a subject without influencing it in any way. Many scientific disciplines especially social science, use this method to obtain a general overview of the subject. It is also employed where testing and measuring large volumes of samples for more qualitative ways of experimentation.

A good research design reduces distortion and increases the dependability of the data collected and analysed at the same time provides the smallest experimental error. A design that imparts maximum information and offers the opportunity to consider a variety of assorted aspects of a problem is accepted as the most suitable and effective plan. Therefore, good design is connected to the aim or goal of a research problem and also to the essence of the problem to be analysed.³⁸

This research commenced with systematic review of literature. Systematic review was defined as a replicable, scientific and easily understood process that envisions to reduce the distortion through comprehensive bibliographic research of published and unpublished studies and providing a control trail of the reviewer's decisions, procedures and conclusions.

The use of systematic review procedures for qualitative studies in the field of social sciences utilizes meta-ethnography which is adopted in obtaining the interpretative synthesis

³⁸ C R Kothari. *Research Methodology Methods and Techniques*. 2nd Edition. New Age International Publishers Limited. India. 2003. p. 41.

of qualitative research and other secondary sources. Meta-ethnography is adopted to synthesize and analyse information about a condition that has been studied immensely. A researcher translates existing studies into his or her own worldview, and through this creates a reading of other people's reading about a subject.³⁹

1.9.2 Methods of Data collection

a) Secondary Data

This research utilized inductive strategy of linking data and theory because the research had a qualitative approach. The green theory was utilized to inform the background of the study. Qualitative research can be expounded as a research strategy that generally underlines words instead of quantization in the capture of data and that: it mainly highlights an inductive approach to the correlation between theory and research, in which the generation of the theory emphasizes; has dismissed the practices and rules of the scientific model nature of positivism in particular, preferably with significance the manner individuals elucidate their surroundings; and packages a vision of social reality as an emerging, ever-evolving property of individual creation.⁴⁰

There are various influences on the conduct of social research which influence the option of research method, creation of research design and data-collection methods; implementation of data collection; examination of findings; analysis and conclusions.⁴¹ This particular research was biased to understanding the Government of Kenya approach in tackling the issue of climate change. Hence, the research was geared to interviewing various Government staff and NGO staff working on Government projects. The research ensured

³⁹ Alan Bryman. *Social Research Methods*. 4th Ed. Oxford University Press. USA. 2012. p. 102.

⁴⁰ Alan Bryman. *Social Research Methods*. 4th Ed. Oxford University Press. USA. 2012. pp. 24 - 36.

⁴¹ Ibid. p. 39.

adherence to ethical matters of secrecy and discretion in relation to recording of information and the safeguarding of records particularly for respondents who requested for it.⁴²

b) Primary Data

Purposive sampling of climate change experts was used to select interviewees of the face -to-face interviews. In- depth interviews involved a significant amount of time used for collecting information from selected specialists in the fields of climate change and human development. The depth interviews are important because they brought out personal views of the matter and likely recommendations to addressing emerging challenges.⁴³

Questionnaires were administered to government, NGO and Development partners, all of whom were knowledgeable in climate change and human development. Hence purposive sampling to pick the informants was utilized. Out of 70 questionnaires that were administered, only sixty six (66) questionnaires were received back which represents 94 percent response rate. Likert scale was utilized in the questionnaire research instrument which gave a multiple-item measure of a set of attitudes associated with human development and climate change. The Likert Scale measured the intensity of feelings specifically in connection between climate change and human development in Kenya and the responses were aggregated to form an overall score.⁴⁴ The self-completion questionnaire was administered to respondents who are experts in the fields of climate change and human development. Hence there was sampling bias whereby respondents were singled- out based on their expertise and knowledge in the subject area.

⁴² Ibid. pp. 142 - 143.

⁴³ C R Kothari. *Research Methodology Methods and Techniques*. 2nd Edition. New Age International Publishers Limited. India. 2003. pp. 136-137.

⁴⁴ Alan Bryman. *Social Research Methods*. 4th Ed. Oxford University Press. USA. 2012. p. 166.

Organized interviews were used in survey research method, whereby all interviewees were given exactly the same context of questioning. The aim of this style was to make sure that interviewees' responses could be aggregated. The questions were discrete and provided the interviewee a set scope of closed ended answers.⁴⁵ Personal interviews and telephone interviews were also deployed. In addition, qualitative research methods namely Delphi method were used whereby expert opinions were sought through face -to -face interviews. Secondary data methods were utilized through literature review and reference to UN and government reports.

Determination of sample size was guided by the number of climate change experts and officers knowledgeable in climate change within the six identified Ministries in the Government of Kenya. The population was hence 85 persons. Determination of sample size when the population is known is given by:

$$s = \frac{x^2 NP (1-P)}{d^2(N-1) + x^2 P(1-P)}$$

Where s= required sample size, x^2 =tabulated Chi square (1.96x19.6 = 3.841), N= population size, P= population proportion (assume 0.5), d^2 = the degree of accuracy expressed as a proportion (0.05). 1.96 is the standard error at 0.05%.⁴⁶ Given that the population target of the study was 85, determination of the sample size was as follows:

$$s = 3.841 \times 85 \times 0.5(1-0.5) / (0.05)^2(85-1) + 3.841 \times 0.5(1-0.5) = 69.910 \text{ round up to } 70.$$

Therefore, 70 questionnaires were administered, however only sixty six (66) respondents submitted their responses.

⁴⁵ Ibid. pp. 186-210

⁴⁶ Robert Krejcie and Daryle Morgan. *Determining Sample Size for Research Activities*. Sage Publications. USA. 1970. p. 1.

1.9.3 Data Analysis

Content analysis was undertaken to understand existing information about climate change and human development in Kenya. Content analysis is an objective and unobtrusive method of analysis that clearly set out replications and gave suggestions for follow-up studies.⁴⁷ Secondary analysis of data by researchers such as IPCC reports and other UN reports was utilized.

Encoding is vital for effective review and, through it, different responses can be minimized to a minute number of classes that contain the crucial information necessary for the analysis. On the other hand, classification was done by organizing data in groups or classes based on characteristics.⁴⁸

Thematic analysis of key concepts and categories that are recurring in the data which relate to the research focus were analyzed after data collection. The analysis provided a theoretical understanding of the collected data that made a theoretical contribution to the literature that was analyzed and relating to the research focus.⁴⁹

Correlation and causal analysis identified the joint variation between climate change and human development. This provided insight into the functional connection between the two variables and understanding in the controlling relationship between the variables and determining causes.⁵⁰

⁴⁷ Alan Bryman. *Social Research Methods*. 4th Ed. Oxford University Press. USA. 2012. pp. 304-305.

⁴⁸ C R Kothari. *Research Methodology Methods and Techniques*. 2nd Edition. New Age International Publishers Limited. India. 2003. p. 153.

⁴⁹ Alan Bryman. *Social Research Methods*. 4th Ed. Oxford University Press. USA. 2012. pp. 578-580.

⁵⁰ C R Kothari. *Research Methodology Methods and Techniques*. 2nd Edition. New Age International Publishers Limited. India. 2003. p. 161.

1.10 SCOPE AND LIMITATIONS

There are many areas of the world economy whereby climate change alleviation and adaption measures are being implemented. However, this research focused on Kenya and it was limited to human development and sustainable development. The challenges of nonlinearities, irregularity and time lapses in natural resources systems propose that systems' modeling is a vital tool for INRM research. Systems modeling are utilized to conceptualize the system, ensure a common comprehension among stakeholders, discover leverage points for interventions, and study various scenarios, to create a foundation of choice maintenance systems, to assist in stakeholder negotiations, to identify systems performance indicators and to aid assessment of impacts.⁵¹

1.11 OUTLINE OF CHAPTERS

The study is divided into five chapters. The first chapter provides the context of the study, the statement of research problem, the objectives and hypotheses of the study as well as literature review and theoretical framework used in the study. The chapter ends with an outline of how this study will be organized.

The second chapter examines the state of human development in Kenya and measures being taken by the Government to tackle challenges posed in key sectors.

Chapter three gives an overview of climate change, its various impacts on Kenya's population and socio-economic wellbeing.

Chapter four provides a critical analysis of the data collected.

⁵¹ B.M. Campbell and J.A. Sayer. 2007. *Integrated Natural Resource Management. Linking Productivity, the Environment and Development*. (CAB International). p8.

Chapter five sums the study by providing conclusions and recommendations in respect to the findings and analysis and also proposes further areas for research.

CHAPTER TWO

THE STATE OF HUMAN DEVELOPMENT IN KENYA

2.0 Introduction

This chapter provides a detailed account of human development in Kenya, its Human Development Index (HDI), the nexus with climate change, human security, environment and development and gender aspects. The chapter also analyzes Kenya Government interventions in enhancing human development.

2.1 Human Development in Kenya

Since gaining self-rule, Kenya has been moving ahead towards attainment of human development. The state's economy has grown in the past five decades, and notable advancement attained in minimizing gender-based differences, sustaining the progress of susceptible portions of the populace, enhancing accessibility to health and sanitation services and facilitating a fair and just access to resources, protection of human rights, and valuing individual aspirations. Even with this development, numerous obstacles persist in achieving more fair and enduring human development. This factors have led to the gap between Kenya's HDI and global averages to widen since the 1980s.⁵²

Kenya has been publishing National Human Development Report (KNHDR) since 1999 to inform public policy and legislative agenda. Advancement in human development in Kenya is generally articulated via assorted indices, namely Human Development Index (HDI), Human Poverty Index (HPI), Human Gender Development Index (GDI), Gender

⁵² United Nations Development Programme. National Human Development Report. *Climate Change and Human Development*. (UNDP Kenya). 2013. p. vi.

Inequality Index (GII), and, in recent times, the Multidimensional Poverty Index (MPI). The HDI represents a drive towards a wider description of human security, and gives a combined measure of three basic angles of human development: wellbeing, learning, and earnings. Kenya's HDI approximates in 2012 were at 0.520 and a UN worldwide study ranked Kenya lowly on welfare and living standards outside yearly financial development standards.⁵³

Environmental challenges are addressed in many national or state HDRs. Even when the environment is not an explicit goal, it is a component of other issues such as sustainable development and has been highlighted at the national level HDR.⁵⁴ Key among environmental challenges are land use challenges based on economic factors such as increase in population density, land tenure, shifting cultivation, lack of land use planning and policy. Climate change is further compounded by habitat fragmentation/ loss of biodiversity, loss of soil fertility and soil erosion, overgrazing, forest degradation, siltation and sedimentation of water bodies, flooding and landslides.⁵⁵

According to the UNDP, the government of Kenya has shown dedication to facilitate conducive environment for attainment of climate resistant human development. Specific guidelines and policies are exhibiting recommendable outcomes, however, a better combination and enforcement and promoting of synergies among implementing agencies of regulations, incentives, and investments is required. There is need for an integrated policy making approach to identify key strategic issues for climate change mitigation and adaptation

⁵³ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). pp. 6-11.

⁵⁴ Sabina Alkire. *Human Development: Definitions, Critiques, and Related Concepts*. Oxford Poverty & Human Development Initiative (OPHI). University of Oxford. UK. 2010. p. 13.

⁵⁵ Ministry of Environment and Natural Resources. *Technical Report on The National Assessment Of Forest and Landscape Restoration Opportunities in Kenya*. 2016. p. 9.

measures to be reviewed in tandem with the country's growth actions to focus collaboration and shared corroboration in social, economic and environmental sectors.⁵⁶

2.2 Climate Change and Human Development Nexus

In 1990, UNDP unveiled the inaugural report on human development which also consisted, the human development index (HDI). Since then, the Human Development Reports (HDR) was published almost annually. Relationships apply the notion of human development to various issues and comprise a numerical indicator with the HDI and other statistics pertinent to human development. The reports define human development as a process of expanding citizen's options to live to their full potential, be educated and enjoy a decent quality of life.⁵⁷

The linkages between climate unevenness and alteration, and human development is bi-directional and influenced by climatic effects, mitigation efforts and adaptation actions. The effect of atmospheric unpredictability and modification of human development relies on concentration of climate change and the choice to adapt or mitigate has long term impact on human development.⁵⁸

The 2008 HDR Global warming explains in detail how the repercussions of rising temperatures, which include reducing farm outputs, coastal flooding, ecosystem breakdown and increasing health risks such as malaria fall mainly on poor states. The distribution of the current emission points to a total inverse relationship in accountability and the risk posed by climate change. The various forms of environmental threats, the need to secure natural

⁵⁶ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). p. 115.

⁵⁷ Sabina Alkire. *Human Development: Definitions, Critiques, and Related Concepts*. Oxford Poverty & Human Development Initiative (OPHI). Op cit pp. 1-2.

⁵⁸ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). pp. 3-4.

ecosystems during financial expansions and the uneven repercussions of ecosystem destruction on the needy have been pertinent matters in eleven of the past global reports.⁵⁹

A climate change vulnerability index was first calculated in Kenya in 2013 by UNDP. It portrays the meaning of experience to climate variations and natural catastrophes, vulnerability to the effects of contact, and ability to become accustomed to constant and upcoming climatic variations. Correlation review involving the climate change vulnerability index (CCVI) and the three indices of human development for whom country statistics are approximated indicated a negative statistically considerable connection linking CCVI and the indicators of human development. Moreover, the correlation is not significant.⁶⁰

Significant factors have been recognized as crucial considerations in tackling climate change: mitigation, adaptation, innovation dissemination and funding. The first two are connected to visible impacts of climate change whereas the others are connected to the ways of obtaining growth targets. Human development has three components: capacity, freedom of process and principles of justice. Human development aims for the expansion of citizenry's liberties and abilities.⁶¹

Human development approach is an action-oriented paradigm, which is holistic, interdisciplinary and integrated approach that strives on the themes of social progress, efficiency of resources and their availability, equity, participation and freedom, sustainability and human security. Human development recognizes no immediate link exists between

⁵⁹ Sabina Alkire. *Human Development: Definitions, Critiques, and Related Concepts*. Oxford Poverty & Human Development Initiative (OPHI). University of Oxford. UK. 2010. pp. 12-13.

⁶⁰United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). pp. 17-18.

⁶¹ Sabina Alkire. *Human Development: Definitions, Critiques, and Related Concepts*. Oxford Poverty & Human Development Initiative (OPHI). University of Oxford. UK. 2010. pp. 24.

economic growth and human progress, but instead the link is derived through deliberation of policies at all levels and by different actors, including the state.⁶²

Engaging all stakeholders in every aspect of a procedure and more so engaging them directly, is a critical requirement for impartial splitting up of duties and tasks in climate change adaptation and mitigation. Information needed to express what would consist durable growth is often isolated within the system limit. Hence, multi-stakeholder processes make certain improved harmonization amid activities that may be duplicated, and information is pooled and used in an effective manner.⁶³

2.3 Human Development and link to Human Security

Since the peace treaty of Westphalia, the main security focus has considered security in the sense of protecting the territorial boundaries of a state from aggressive attack. The basis was the territorial boundaries of a state and the main factor was anticipated invasion and attack. The paradigm of human security moves the focus of territorial analysis from the physical boundaries to the people who live in a country. It enlarges the focus from territorial invasion, to several threats that could challenge citizenry's safety, self-respect and businesses.

Human security scrutinizes the relations between various aspects and recognizes that the main dimension of human development are of inherent worth. Both human security and human development emphasize sustainability and stability of outcomes, emphasis on humanity's vulnerabilities and fragilities, particularly with respect to the environment. Both

⁶²Tim Scott and Aguenda Perez. *The Concept of Human Development*. Human Development and Capability Association. United Nations Development Program. 1998. pp. 1-2.

⁶³ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 128-129.

emphasize the need to empower people as agents and clarify the obligations of other institutions in protecting human beings.⁶⁴

2.4 Environment and Development

Climate change will cause enormous biological and financial challenges. Hence, in such a situation, reducing dehumanizing paucity and obtaining Sustainable Development Goals (SDGs), will become more complex. Attaining the SDGs relies substantially upon well-functioning ecosystems. In Kenya, the environment has gradually degenerated. For example, mountain ecosystems such as the mountain ranges of Mount Kenya and Aberdare have been devastated by deforestation, illegal logging, non-indigenous plantations, excessive cultivation and other forms of human invasion.

This situation threatens water catchments vital for the country's agriculture, livestock, and tourism and energy sectors. Kenya's agriculture is mostly rain-fed and irregular weather patterns hamper food security. Kenya's energy sector heavily relies on hydropower, and reduced water flows also affect production of power to run industry and for household use. High energy costs inadvertently slow down economic growth. Soil erosion due to deforestation also affects food production and hastens desertification.⁶⁵

⁶⁴ Sabina Alkire. *Human Development: Definitions, Critiques, and Related Concepts*. Oxford Poverty & Human Development Initiative (OPHI). University of Oxford. UK. 2010. pp. 36-37.

⁶⁵ Wangari Maathai . *The Concept of Human Development*. Human Development and Capability Association. United Nations Development Program. 1998.

Payment for Ecosystem Services (PES) schemes, is a calculation which pays farmers for minimizing harmful impacts on the surroundings and strengthening ecosystem services like restoration of forests, with likely societal and financial profit.⁶⁶

2.5 Gender and Human Development

The ability to adapt to Climate change is critical for attainment of human development. However, female gender are more susceptible to the impacts of climate change in comparison to their male counterparts, due to the fact they make up the largest portion of earth's deprived, and are more reliant on natural resources which are endangered by climate variability for their living. In addition, they encounter societal, financial, and political obstacles that inhibit their resolve. In Kenya, school enrollment among girls is much lower compared to boys, and in the job market, the female gender adds up to 30 per cent of the general workforce.

Notwithstanding the fact that females consist fifty one per cent of the population, their representation in secondary and tertiary institutions, waged labor, SMEs, and decision making process is restricted. They are badly impacted by customary and societal practices, paucity and spousal abuse, and a myriad of other challenges.⁶⁷ Women are also accountable for 80 percent of waged and unwaged casual employment in agriculture, such as staple crops.⁶⁸

⁶⁶ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). p. 115.

⁶⁷ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). pp. 14-15.

⁶⁸ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. p. 20.

A study undertaken in Samburu County by the University of Nairobi portrayed that the effects of climate variability were experienced unevenly amongst the two genders. Female gender because of roles traditionally constructed by the society were more susceptible to the effects in comparison to men. The study revealed that female gender were more capable in adapting and possessed more improved methods which enabled them to cope. The research hypothesized it was necessary to incorporate a gender perspective into the strategies and constitutional guidelines which regulate climate change adaptation and mitigation in Kenya, to ensure incorporation of both gender for risk distribution and growth. The research also established that culture and practices are notable factors that determine the level at which communities are affected.⁶⁹

Another study undertaken by Human Rights Watch in Turkana County reveals that female gender frequently trek great distance to search for water in parched riverbeds. A large number of minors fall ill due to contaminated water. In addition, enlarged rivalry over pasture and water has increased the possibility of clashes and armed conflict.⁷⁰

Access to commodities such as food and water are a basic human right, which is being challenged by adverse impacts of weather variability. The Government needs to ensure the National Adaptation Plan execution plans decrease the trouble of these impacts principally to rural communities, women, children and persons with disabilities. The

⁶⁹ Eunice Ongoro and William Ogara. *Impact of Climate Change and Gender Roles in Community Adaptation*. International Journal of Biodiversity and Conservation Vol. 4(2), 2012. <http://www.academicjournals.org/IJBC>. p. 78.

⁷⁰ Human Rights Watch. 2015. *There is No Time Left. Climate Change, Environmental Threats, and Human Rights in Turkana County, Kenya*. p. 3.

Government should also promote nondiscrimination in all national policies, action plans and strategies.⁷¹

The Millennium Ecosystem Assessment reports that, climate change is expected to develop into the leading cause of extinction species particularly through deforestation and in rural areas where communities are highly dependent on biomass energy, the ability to obtain these indispensable resources are minimized. Reducing flora and fauna not only impact physical well-being and livelihoods, it also breaks down access to safety measures, resilience, societal interaction, healthiness and liberty of options and actions. Biodiversity reduction has an unequal effect on needy people in emergent economies.

Looking at the prevailing scenario of climate variability, insufficient access to water, low water standards, and long periods of time spent to look for water and fuel wood affects women and the well-being of their households. It also affects agricultural production, care of farm animals and increase amount of labor to collect water and fuel wood at the expense of engaging in other economically viable businesses.⁷²

2.6 Integration of Human Development and Climate Change in Kenya's Development Planning

It is approximated that Kenya requires roughly 1-2 billion dollars annually by 2030 to tackle existing and anticipated climate change impacts. Unless effective mitigation and adaptation steps are effected, climate change will slow down achievement of Vision 2030. The effects of climate change on human development will not be arrested by lone organizational mandate

⁷¹ Human Rights Watch. 2015. *There is No Time Left. Climate Change, Environmental Threats, and Human Rights in Turkana County, Kenya.* p. 6.

⁷² United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development.* (UNDP Kenya). pp. 16-17.

or physical territories. To efficiently tackle these challenges, there should be stakeholder participation. This need articulate information flow and formulating robust communication channels to enhance awareness of complementarities and synergies, foster cooperation and maximize results to achieve resilient human development.⁷³

Climate change is causing an array of effects across vital sectors and people. Utilizing a rational system to strategy creation and assessment can stimulate collaboration. The integration and mainstreaming of climate change adaptation into main growth aims, strategy and tactics needs the approval of an Integrated Policymaking approach (IP). Climate change policy work should consider organization, prototypes and policies. Understandable and dependable guides for policy making and assessment should also be set-up, along with set-out roles.

Sufficient preparation requires to be done continually to tackle the effects of climate variability. This preparation needs to factor the larger aspect of long-term growth. In addition, involving all community members who have a stake ought to be done to guarantee synchronization of all players in managing effects of climate variability. This engaging of various stakeholders needs to be well synchronized to reduce replication of work and minimize disagreements which also guarantees proper utilization of capital and positive collaboration.

The Government of Kenya has identified priorities that include activities to enhance farm production and hardiness, funds in environmental rehabilitation to arrest climate change effects on physical structures, enhancement of the ease of access and cost of medical

⁷³ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). pp. ix-x.

services, hastening up of hygiene services, and safeguarding of tourist attractions. Countrywide individual and organizational capabilities need to also be enhanced at all levels of climate change studies, interventions, preparation and execution.⁷⁴

Climate change traverses boundaries hence the need for global collaboration by various governing structures: multiparty, two-sided, international, national, and local. Laws and regulations and action plans, particularly for conservation of innate assets, needs to be synchronized outside Kenya's territory, by the formation of global strategy and agreements, and partnership and cooperation.⁷⁵

2.7 Human Development and Food Security

The connection between food production and climate variability is a matter of growing concern. Global food production is anticipated to reduce with anticipated climate change concerns, presenting a danger to international food security. However, agriculture also contributes a significant amount, 12- 14 per cent, to global emissions annually due to land conversion and deforestation for agriculture. Climate smart agriculture is recommended as it encompasses utilization of 'climate smart' farming methods.

Climate-smart agriculture is a technique for the development of technical, political and investment setting to obtain long-term agricultural growth for food security in the prevailing atmospheric conditions. Climate smart agricultural practices enhance resistance to climate change, reduce greenhouse gases emissions, and improve food security. To be effective, climate smart agriculture must address the need for increased food production to

⁷⁴ United Nations Development Programme. National Human Development Report. 2013. *Climate Change and Human Development*. (UNDP Kenya). p. 105.

⁷⁵ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. p. 129.

meet Kenya's growing population, manage land wisely and minimize the strain to change land for farming, consider the political sensitivity of farming, and, add to international political commitment to enlarge sustainable agriculture.

The agricultural sector in Kenya provides employment to sixty five per cent of informal employment and contributes directly to 24 per cent to the GDP and indirectly another 27 per cent. Notably, several global treaties and declarations recognize food generation as a huge cause for worry because climate change effects could have a harmful effect on food production, yet at the same time, farming is also a key cause of emissions. Policy plans to stabilize the two aspects of agriculture and climate change are therefore required. The IPCC 4th appraisal account predicts that climate change might cause decreased crop yields by up to 50 per cent by the year 2050 and developing countries such as Kenya will be more vulnerable if there is no implementation of appropriate adaptation strategies.⁷⁶

To enhance food security in Kenya, conservation agriculture that involves a variety of methods needs to be implemented. Conservation agricultural practices include: altered ploughing methods that reduce soil disturbance, preserving plant residue on farms and minimizing soil attrition; growing more resistant crop species and engaging plant rotation; agroforestry; fertilization with livestock manure. Implementation of climate smart agriculture is a responsibility of the Ministry of Agriculture, Livestock and Fisheries whereas the Ministry of Environment and Natural Resources coordinate climate change in Kenya as per the Climate Change Act 2016.

⁷⁶ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. pp. 8-14.

In response to the dangers of climate change, precedence should be given to agricultural strategies that aim to increase production and incomes by intensifying irrigated agriculture, improving availability and affordability of farming requirements, funds, relevant discounts, plant and farm animal insurance, and efficient outreach programs. Support for diversifying into weather resilient and more rapidly growing crop species, particularly those commonly referred to as 'orphan crops' like sorghum and millet. Research and use of ICT to improve commercialization of farming and motivate young citizens to engage in agriculture are among key interventions.⁷⁷

2.8 Kenya's Land tenure System and impact to Human Development

The UN defines land tenure as follows, "land ownership is the relationship, constitutionally or habitually described, between people, as individuals or communities, in reference to the earth." The constitution of Kenya recognizes land as private, public or communal. For climate smart agriculture to succeed as described above, land tenure rights have to be considered and the occupancy system adopted should also endeavor to please diverse policy aims like: competence in land utilization; equity and fair admittance to all societal categories particularly needy or susceptible communities; synchronizing with other strategic plans tackling financial growth; continuity so as to avoid sudden interruptions in the prevailing political and customary setting. These goals must be obtained whether the land is held in freehold, leasehold, customary or other interests.⁷⁸

⁷⁷Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 127.

⁷⁸ Ministry of Environment Water and Natural Resources. *Forest Governance, REDD+ and Sustainable Development in Kenya*. UN-REDD Programme Report. Kenya. 2013. pp. 9-10.

The National Land Policy identifies all land in Kenya as Public Land, Community Land and Private Land and further, the Constitution and National Land Policy provide a framework recognizing community land rights. Subsequently, tenure relies on and is conditioned by governance. Effective land tenure can only succeed with supportive policy and institutional systems.

Subsequently, the National Land Policy deals with environmental management and requires, among other things, the preservation and suitable management of natural land resources, such as forests, national parks and dry and ASALs. It also needs an environmental review and an audit of all land activities that can erode the environment and requires cross-sector synchronization and collaboration between natural resource -based Ministries like agriculture, water, energy, housing and urban development, industry and tourism. This strategy can hence improve the accomplishment of climate change mitigation and adaptation if properly enacted and implemented.⁷⁹

2.9 Landscape Restoration and Human Development

In Kenya, although there is a wealth of natural resources, they are being quickly depleted and climate change is amplifying the effects of this depletion. The Kenyan Government has enacted a number of laws and policies that aim to restore landscapes so that they can continue to provide valuable services that enhance human development. These include the Constitutional requirement of 10 per tree cover, the National Climate Change Response Strategy, and Kenya's Vision 2030.

⁷⁹ Ministry of Environment Water and Natural Resources. *Forest Governance, REDD+ and Sustainable Development in Kenya*. UN-REDD Programme Report. Kenya. 2013. pp. 13-28.

In 2016, the Ministry of Environment and Natural Resources released a report covering the countrywide assessment of forest and landscape restoration opportunities in Kenya, which clearly spelt out the various options that encompass: afforestation and rejuvenation of degraded indigenous forests; agro forestry and growing trees on farms; growing trees for sale and large -scale bamboo farming; planting trees to prevent soil erosion along river banks, marshlands and along highways; proper pastoralist silviculture practices and rehabilitating ASALs.

The report identified avenues to increase agro-forestry to minimize soil attrition, enhance income options, producing of animal feeds and soil fertility. In addition, it identified existing forests that can be restocked, as well as locations natural forests can be established to increase carbon sequestration, provide biodiversity habitat, and prevent landslides and flooding. The report mapped out locations where trees can stabilize river banks and control sedimentation, locations to invest in commercial plantations; roadways on which trees can be planted to reduce water runoff and air pollution and rangelands which might benefit from improved management practices.⁸⁰

2.10 Conclusion

Various reports reveal that Kenya's human development is affected by climate variability and unpredictability and human security is not assured due to adverse climatic patterns. Notably, Kenya is actively involved in climate change negotiations and has been seen as a leader in environmental matters in the region. Kenya has also been pushing for financial aid which is a motivation for participating in climate negotiations. However, adequate external/ donor funds

⁸⁰Ministry of Environment and Natural Resources. *Technical Report on The National Assessment Of Forest and Landscape Restoration Opportunities in Kenya*. 2016. p. 9.

to implement various climate change strategies has been inadequate, which increases community vulnerability and hampers human development. Therefore, to tackle obstacles that hinder the growth of its Human Development Index, the Government of Kenya need to enhance a multi-sector approach that will synchronize existing policies, strategies and action plans amongst relevant Ministries and stakeholders.

CHAPTER THREE

CLIMATE CHANGE AND HUMAN DEVELOPMENT IN KENYA: AN ANALYSIS.

3.0 Introduction

The previous chapter has given a detailed review of the status of Human Development in Kenya, and how it has been influenced by human security, environment, gender, development planning, food security and Kenya's land tenure system. All these factors are viewed as essential for human development in Kenya, however all are inter-related and need to be tackled simultaneously.

This chapter reviews various effects of climate change in Kenya and steps being taken to mitigate its effects and build resilience. However, this chapter seeks to focus on specific sectors namely; Agriculture sector including livestock and pastoralism; Water sector; Environment sector with emphasis on Forestry; and Energy sector.

3.1 Kenya's geography and topography

Kenya has a population of approximately 48 million with a growth rate of 2.57%. It lies between latitudes of 4 degrees North and 4 degrees South between longitudes of 34 degrees East and 42 degrees West. It is bordered by Somalia to the East, Uganda to the West, Tanzania to the South, Sudan to the North-West, Ethiopia to the North, and the Indian Ocean to the South-East. The area of both land and sea is approximately 584,000 square kilometres.

Kenya experiences varied environmental limits with altitudes ranging from sea level to more than 5000m in Central parts of the country. The average yearly rainfall varies from as little as 250mm in arid regions to over 2000mm in highland regions. Soils vary from swampy, alluvial, and black cotton soils mostly in the Rift Valley and savanna grasslands to the coral types on the coast. Central parts of Kenya are characterized by productive volcanic

soils whereas in the drier areas the soils are thin and unproductive. Such diversity has encouraged growth of a wide variety of plant genetic resources.⁸¹

Kenya has a diverse topography including Mount Kenya with ice glaciers and snow-capped peaks, to Chalbi desert in the North, the Great Rift Valley with volcanoes to coral reefs and islands at the Coast. 83 percent of Kenya is arid and semi-arid climate and only about 20 percent of land is viable for agriculture. Major rivers drain from the central highlands flowing eastwards to the Indian Ocean and other rivers flowing westwards into Lake Victoria.

The country's vegetation includes Afro-alpine moorland which is found in mountain ranges, highland grass mostly in central Rift -Valley, highland moist -forest, typical montane forest, relicts of Guineo-Congolian rainforest in Kakamega County, coastal forests and woodlands, coastal evergreen bushland, thorn bushland and woodland in Amboseli and Tsavo national parks, semi-deserts, swamps and wetlands.⁸²

Only 17 percent of Kenya's landmass is arable while 83 percent consists of ASALs. The country's innate possessions include wealthy array of animal and plant life but climate change threatens this rich biodiversity. Kenya lacks sufficient water supply and clean drinking water is unevenly distributed.⁸³

3.2 Climate change in Kenya

The Kenya Meteorological Department (KMD) has issued information on temperature and rainfall trends in Kenya since independence and the evidence of climate change is apparent.

⁸¹ Government of Kenya 2010. *Agricultural Sector Development Strategy 2010-2020*. pp. 3-8.

⁸² Kenya Tourist Board. *Kenya General Information*. www.magicalkenya.com. Accessed 28/9/2018

⁸³ Ministry of Environment and Forestry. *National Climate Change Response Strategy*. Government of Kenya. 2010. pp. 9-10.

Starting in the 1960s, Kenya has basically encountered growing atmospheric heat in large portions of the country. Interestingly, the rise in least temperatures is sharper compared to the highest temperatures. The least amount of atmospheric heat has grown by 0.7 - 2.0 degrees centigrade and the maximum by 0.2 - 1.3 degrees centigrade.⁸⁴

Yearly high rainfall seasons reveal severe rain amount in the 21st Century are substantially lesser than rains in the early 1960s. There is also an indication of heavy rains taking place more intermitted in the coastal region and in the northern part of Kenya in the seasons of September-October-November and December-January-February. It is approximated close to 17 percent of Mombasa, or 4,600 hectares of surface area will be below water if the Indian Ocean rises by only 0.3 meters and there will be huge portions of land might become uninhabitable.⁸⁵

These changes in temperature and precipitation have a profound impact on the country's various sectors, and a majority are susceptible to the climate. Key sectors of Kenya and land use systems that are affected include agriculture, rangelands which support rearing of livestock, wildlife and tourism, forestry, water resources, aquatic and marine resources, health and physical and social infrastructure.⁸⁶

Drought has been a climate hazard that has recurred severally in Kenya specifically 1983/1984, 1991/1992, 1995/1996, 1998/2000, and 2008/2011. Each drought has led to adverse plant and animal losses, deprivation and movement of inhabitants. In 2008/2011, drought slowed down the GDP by of 2.8 percent yearly. Excessive flooding in Kenya has

⁸⁴ Ministry of Environment and Forestry. *National Climate Change Response Strategy*. Government of Kenya. 2010. p. 9.

⁸⁵ United Nations Development Program. *Kenya National Human Development Report. Climate Change and Human Development: Harnessing Emerging Opportunities*. 2013. Government of Kenya. pp. 42

⁸⁶Ministry of Environment and Forestry. *National Climate Change Response Strategy*. Government of Kenya. 2010. pp. 6-7.

been occurring on average every 3 to 4 years and is associated with El Nino or La Nina periods which cause intense weather patterns. The 1997-98 El Nino floods cost Kenya 11% of GDP but the worst El Nino experienced by Kenya was in 2007-08.⁸⁷

Rainy seasons are becoming wetter, with unexpected and/ or delayed onset. During floods there is an increase of waterborne or sanitation-related illnesses. Floods affect the GDP with losses of 5.5 percent every seven years. Kenya's coastline is also vulnerable and sea level rise could lead to sections of Mombasa Island being submerged, increasing risk of ground water salinity which may lead to migration and environmental refugees and likely loss of agricultural income.⁸⁸

Undesirable effects of weather variability in the country comprise species loss, receding rangelands that threaten pastoralism, serious droughts leading to malnutrition, hunger and starvation, reduced production of staple foods and other major foods and increased imports, disease outbreaks, population displacement and migration, destruction of tourist attractions such as the snow-caps of Mount Kenya, exacerbating human -wildlife conflict in the search for pasture and waterholes, loss of fish populations, reduction in hydropower potential, destruction of infrastructure due to flooding among other negative impacts.⁸⁹

According to the UNDP, the impact of climate variability in Kenya is decreased food production, increased water scarcity, more floods in coast regions, and severe weather

⁸⁷ United Nations Development Program. *Kenya National Human Development Report. Climate Change and Human Development: Harnessing Emerging Opportunities*. 2013. Government of Kenya. p. 2.

⁸⁸ Ministry of Environment and Forestry. *Kenya National Adaptation Plan 2015-2030*. Government of Kenya. 2016. p.7.

⁸⁹ Ibid. pp. 10-12.

actions, disintegrating of ecosystems, and rise in risk of disease outbreaks. Yearly, the country's is affected by a loss of 2.6-3% of GDP a trend that is estimated to continue upto 2030. Kenya's vulnerability has a very low score on the National Climate Change Index, evident from increasing average surface temperatures in many parts of the country; increasing rainfall variability over time and space and serious and recurrent drought and flooding.⁹⁰

The United Nations Framework Convention on Climate Change (UNFCCC), which has been agreed by 195 states, guides international climate policies. National principles on climate change are prejudiced by international and regional strategies, but are adapted to respective state's material well-being. The UNFCCC Parties have resolved to engage in adjustments that lessen impacts of weather variability and to account their performance through regular country exchanges and their emission and absorption of greenhouse gases through national GHGs inventories.⁹¹

To mitigate on the effects of climate change the GHG inventory explains the low-carbon evaluation carried out in the six key sectors: power, transportation, commerce, crop growing, forestry and waste administration. Review of six low carbon progress alternatives for energy sector revealed that geothermal energy portends the leading abatement potential (14MtCO₂e per year) in 2030, with other innovations ranging from 0.5 and 1.4 MtCO₂e. The alternative with the biggest mitigation capability in the transport sector is growth of widespread transport structure and civic transportation has an abatement capacity

⁹⁰United Nations Development Program. *Kenya National Human Development Report. Climate Change and Human Development: Harnessing Emerging Opportunities*. 2013. Government of Kenya. pp. 1-2.

⁹¹ Food and Agricultural Organization of the United Nations. *Climate Change Guidelines for Forest Managers*. FAO Forestry Paper 172. Italy. 2013.p. 15.

of roughly 2.8MtCO₂e a year by 2030. The analysis showed 95% of industrial manufacturing emissions in the country are caused by two industries: cement and charcoal production. Low carbon growth prospect is in availing of resourceful kilns for charcoal with an abatement capacity of 1.56MtCO₂ per year in 2030.⁹²

Agroforestry, restoration of forests and degraded lands and landfill methane capture are also proposed mitigation measures. Challenges include data availability, inadequate funding and quality and structures of data management, need for better prediction of likely weather variability at lesser scale, the growth of adequate impact simulation models, and better predictions and forewarning system. Better exchange of information among scientists, journalists, policymakers and other stakeholders can enhance knowledge.

3.3 CLIMATE CHANGE IMPACTS ON VARIOUS SECTORS IN KENYA

Changes in temperature and precipitation are the two climate factors largely studied around the world to give proof of climate change. In Kenya, the Kenyan Meteorological Department (KMD) has been giving data on temperature and changes in precipitation since independence that support claims of weather variability in the country. Effects of climate change in the country are therefore happening as highlighted in this section.

Kenya has a land area of approximately 582,350 square kilometers but approximately 17% of this is land is suitable for agriculture and 83% is made up of dry regions, desert and

⁹² Ministry of Environment and Natural Resources. *Kenya's Intended Nationally Determined Contribution (INDC) Report*. 2015. pp. 2-7.

savannah grasslands. Kenya's features include a vast array of plant and animal life which is however threatened by climate change.⁹³

a) Water resources

Climate change has negative impact on marine ecosystems evidenced by coral reef bleaching. Other future effects are anticipated to be submergence of coastal islands and dislocation of swampland, attrition of coastal lines, amplified salinity and invasion of saline water into coastal aquifers a phenomena that has already been observed in Lamu. Massive sedimentation due to erosion from flooding and droughts will lead to loss of mangroves which are used for fisheries, wood products and coastal protection.⁹⁴

Large floods periodically affect the Lake Victoria basin, the Bajo, Tana basin and the coastal counties, which occur on average six times in the last 50 years. In these regions greater sedimentation takes place. Floods transport fertilizers and pesticide residues in water bodies that affects water quality and aquatic life.

Adaptation and mitigation measures for water resources that are proposed by the Government of Kenya include: constructing basins to transfer water from regions with surplus to regions with water shortages; invest in decentralized county water re-use facilities to reduce waste; application and / or implementation of laws and regulations for the effective management of water resources; increase the capture and conservation of rainwater; developing water infrastructure; building capacity by educating communities to protect watershed and monitor water quality; de-silting water bodies and dams to enhance storage

⁹³ Government of Kenya. *National Climate Change Response Strategy, 2010*. Ministry of Environment and Mineral Resources. pp. 28-30.

⁹⁴ Government of Kenya. *National Climate Change Response Strategy, 2010*. Ministry of Environment and Mineral Resources. pp. 32-33.

capability, water harvesting and quality; protecting and managing water catchment regions; awareness campaigns; among other interventions.

In Kenya, the consultative design to the development and conservation of water resources is incorporated into the "Integrated water resources management program based on water basins and large water resources". It supports the capacity building of community initiatives as sustainable fishing and high value economic activities, tree nursery establishment, value addition initiatives all of which shore up protection of water catchments because local residents are able to see the significance of taking care of natural assets. The program encourages multiple-use approach to preservation of water basins and promotion of eco-tourism and cultural activities to contribute to conservation efforts.⁹⁵

b) Impact of Climate change on Kenya's Agriculture and Food Security

Agriculture is a major contributor to Kenya's wealth. Manufacture of "industrial crops, food crops, horticulture, livestock, fisheries and forestry" directly consists of 24% of the GDP and ultimately another 27%. Over 65% of unofficial jobs in countryside regions is reliant on agricultural, and female gender account for 80 percent of waged and unwaged labor in farming.⁹⁶

Climate change affects food availability, accessibility, utilization and stability due to increased droughts and floods, which lead to losses in agricultural produce. Adverse weather fluctuations compounded by wrong land use such as deforestation have led the country to

⁹⁵Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 52-53.

⁹⁶ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014.

successive crop failure. This has further increased importation of basic food commodities such as maize, reduction in production of tea, sugarcane and wheat and reduced export of crops like tea.⁹⁷ Kenya's draft National Energy and Petroleum Policy 2015 identifies plant residues from agriculture and forestry, together with wood fuel, as some of the sources of biomass which can be utilized to generate heat, fuel and electricity.⁹⁸

Horticulture production has also been affected due to high susceptibility to the effects of climate unevenness and alteration. Climate has intense impacts on populations of plant vermin such as insects, mites, slugs, aphids and moths and, it is anticipated temperatures will increase in the tropics facilitating some pest genus to increase in number. Rise in sea levels at the Coast will also affect mangoes, cashew nuts and coconuts.⁹⁹

The hot water phases reduce the production of plankton and cause a decrease in the fish population. Furthermore, variations in ocean circulation are expected to result in the loss of some fish populations or to the creation of new ones. Temperature variations can affect the reproduction period of the fish and the success of the larvae, thus changing the whole life cycle and the size of aquatic populations. Heavy tropical storms and sea level rise will make fishing a precarious action. Based on IPCC estimates, the sea level will increase by approximately 17cm and 59cm by the ending of the century. Oscillation of water flows and to some point lake levels, changes reproduction ecosystem of fish.¹⁰⁰

⁹⁷ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. p. 34.

⁹⁸ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 78.

⁹⁹ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 35.

¹⁰⁰ Ibid. pp. 37-38.

The strong winds and sandstorms that prevail in most of Northern Kenya have contributed to reducing the availability of forage, as they blow away the seeds of the soil and grass, so the regeneration of the grass is impossible even when it rains. Outbreak of infections such as Rift Valley fever (RVF) and foot and mouth disease have been linked to climate change. It is known that the Rift Valley fever epidemic occurs during periods of high humidity due to abnormal rains. This leads to loss of income by pastoralist communities and frequent bans on meat exports.¹⁰¹

Occasional and adverse droughts have impacted Kenya by reducing the fodder in the pastures, drying and significantly decreasing the quantity of water in rivers, which in turn impacts the wildlife, a resource on which the tourism sector relies upon. The destruction of the ecosystem of the Mau forest has also affected one of the marvels of the natural world: the migration of thousands of wildebeests through the Mara River in Maasai Mara Reserve in Kenya, to Serengeti National Park in Tanzania.

Global warming could interrupt and even spoil some of the tourist attractions, such as snow-capped mountains, coastal forests, fragile marine ecosystems and marine parks. With rising sea levels, the well-known beaches will eventually disappear and some hotels along the coast have had to build retaining walls to safeguard themselves from the strong tides.

Climate change is expected to cause recurrence of some wildlife diseases such as trypanosomiasis, anthrax and a host of parasites. Another notable discovery of the 2008 Davos Conference on Climate Change and Tourism was that CO₂ emissions from land and

¹⁰¹Government of Kenya. *National Climate Change Response Strategy. 2010*. Ministry of Environment and Mineral Resources. p. 35.

air transport are likely to hurt the tourism industry. Global aviation is greatly responsible for emissions.¹⁰²

Proposed mitigation and adaptation in Kenya's Agricultural Sector include teachings on climate-smart farming which has been realized through execution of projects in Malawi, Vietnam, and Zambia by the FAO. A sensible factor that could stop farmers from incorporating climate-smart farming methods is the requirement for resources on the farm for other uses. For instance, conservation farming requires retaining mulch from previous harvest as mulch to provide shade and micro nutrients; still, farmers may have to use crop residue as animal fodder instead. Furthermore, underprivileged farmers may choose not to put into practice some climate-smart farming activities on their land due to holdup between execution of the activity and manifestation of the profit.¹⁰³

The Climate Smart Agriculture (CSA) Strategy observes inconsistency between agriculture, food security and climate change leads to ineffectiveness in the execution of climate change mitigation and adaptation measures. Hence CSA provides an avenue to address the inconsistency with a main objective of mainstreaming sustainable land and agricultural-water administration into production systems to increase hardiness of farmers, herders and fishermen.¹⁰⁴

Rain-fed agriculture is the second-most contributor to Kenya's GDP, with tea, coffee and horticulture contributing significantly to the country's foreign exchange income. Given it's Depending on the climate, farming sector will continue being the most affected by

¹⁰² Ibid. pp. 35-37.

¹⁰³ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. p. 18.

¹⁰⁴Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 49.

climate change. Government activities in this sector include: funding counties to utilize adaptation measures such as early warning system to alter timing of planting dates; enhance technical and financial support to more drought resistant crops like sorghum, sweet potatoes, cassava, millet; promoting irrigated agriculture; addressing land degradation to increase rain-water infiltration and reduce run-off.

Promotion of Conservation Agriculture (CA), whose objective is to achieve sustainable and profitable agriculture and to improve farmers' livelihoods by applying the CA principles of minimum soil disturbance, permanent land cover and crop rotation.¹⁰⁵ Other mitigation and adaptation measures that are being implemented in agriculture include: enlarging rural economies through value addition to agricultural products; investing in research and development; innovative insurance scheme; enhancing agricultural extension services to train farmers; strengthening pest management systems; and, developing proper food storage facilities.¹⁰⁶ Providing efficient and affordable technologies and other incentives to convert farm residues into energy sources such as briquettes or biogas would also be beneficial to farmers.¹⁰⁷

In livestock and pastoralism, mitigation and adaptation measures include: breeding livestock from different agro-ecological regions that adjust adequately to climatic vagaries, developing special livestock insurance schemes, cross border disease surveillance and regular vaccination campaigns, early warning systems; training rural communities on identification and setting up of banks of emergency forage from plant residues, forage and seasonal or perennial pasture, conservation of seasonal wetlands; investing in storage of fodder;

¹⁰⁵ . p. 50.

¹⁰⁶ Ibid. p. 51.

¹⁰⁷ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 78.

inventory of indigenous knowledge; promoting economic diversification among pastoral communities; awareness campaigns on importance of balancing stocking rates to ensure sustainable pastoralism.¹⁰⁸

Agricultural growth methods like risk management schemes can assist small-scale farmers to manage climate change effects and such schemes are being implemented on pilot basis in various counties through Public Private Partnerships (PPP). Small-scale insurance scheme is anchored upon anticipated rainfall and region-specific crop models, and gives a safety net for serious crop destruction caused by adverse weather conditions.¹⁰⁹

(c) Impact of Climate Change on Kenya's Health Sector

Global warming and rainfall unpredictability have far-reaching effects on human health and public safety. Rise in mean temperatures leads to infestation of disease vectors especially mosquitoes in regions that were previously too cold for them. In Kenya, outbreaks of water borne diseases such as cholera, dysentery and typhoid have been fueled by flooding during heavy rain seasons. Flooding also endangers human life for those living in flood prone regions. In contrast, prolonged drought in Kenya leads to severe malnutrition and stunted growth among children, severely affecting human well-being.

Prevalence of malaria transmitting mosquitoes has been spreading to new locations, specifically in the highland regions. In the past, transmission of malaria was limited to seasonal outbreaks in the high altitude areas of the highland regions. With climate change however, it is anticipated that the potency as well as the length of the transmission season

¹⁰⁸ Government of Kenya. *National Climate Change Response Strategy. 2010*. Ministry of Environment and Mineral Resources. pp. 51-52.

¹⁰⁹ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. pp. 36-37.

will rise in malaria prone areas. Communities living at altitudes above 1100 meters vulnerable to malaria epidemics due to a lack of immunity, lack of preparedness, climate variability and other factors.¹¹⁰

Climate change impacts on human health in Kenya are further compounded by lack of access to proper healthcare in rural regions, inadequate relief food and infrastructure, poverty, lack of alternative sources of income especially in areas with marginal rainfall, inadequate public awareness of disease risks, among other factors.¹¹¹ Other expected health effects of climate change in Kenya include increase in acute respiratory infections in ASAL areas, rise in diarrheal diseases in water scarce areas, emergence and re-emergence of Rift Valley Fever, increase in cases of leishmaniasis/ protozoan parasites and malnutrition, and rise in waterborne diseases in lowlands due to flooding.¹¹²

Adaptation actions that are being undertaken by the health sector include enhanced disease surveillance and improved access to water and sanitation. The Government has also prioritized universal access to healthcare to boost affordability and access to health services for all Kenyan citizens.¹¹³ The Ministry of Health is working to improve the adaptive capacity to respond to the increased risk of malaria by enhancing early warning and response systems with information on the likely incidence of climate-sensitive health outcomes,

¹¹⁰ World Health Organization & United Nations Development Program. *Climate Change Adaptation to Protect Human Health*. Public Health & Environment Department. Switzerland. 2015. p. 1.

¹¹¹ John Nganga. *Climate Change Impacts, Vulnerability and Adaptation Assessment in East Africa*. Department of Meteorology. University of Nairobi. pp 3-4.

¹¹² World Health Organization & United Nations Development Program. *Climate Change Adaptation to Protect Human Health*. Public Health & Environment Department. Switzerland. 2015. p. 2.

¹¹³ Prof. Daniel Olago. *Kenya: Climate Change Impacts, Vulnerability, Mitigation and Adaptation Strategies*. Institute for Climate Change & Adaptation (ICCA) and Department of Geology. University of Nairobi. Kenya. p. 3-4.

increasing capacity of health sector institutions to respond to climate -sensitive health risks based on early warning information, and disease prevention measures piloted in areas of increased risk from climate change.¹¹⁴

d) Climate Change impact on Kenya's Energy Sector

Kenya is a growing economy which requires huge amounts of inexpensive, but efficient energy services to propel an orderly rate of societal change and economic growth. Kenya depends mainly on biomass energy which is mostly composed of firewood, coal and agricultural waste. The majority biomass is utilized in rural homes and small businesses. Some necessary interventions were: controlling the extraction of water from the river upstream; zero rate on renewable power innovations; promote utilization of other energy including solar, biomass, wind and biofuels; promote proficient wood stoves, solar kitchens and LPG, and the relevant ministries tackling cost problems by granting subsidies or tax exemptions to poor families.

Access to clean and modern power sources such as electricity in all sectors, is vital particularly in the manufacturing and services sector. Kerosene and biomass are the most commonly consumed types of energy by Kenyan families according to the Ministry of Energy, which reveals that approximately sixty eight percent of homes utilize timber as the major supply of energy for preparing food and warming homes. Petroleum goods constitute twenty two percent, most are used in transport, whereas nine percent is utilized in the electricity segment.

¹¹⁴ World Health Organization & United Nations Development Program. *Climate Change Adaptation to Protect Human Health*. Public Health & Environment Department. Switzerland. 2015. p. 2.

Electricity, due to its resourcefulness in appliance, is essential for financial development and access to electricity. Climate change impacts all aspects of the electricity sector, from production to circulation and utilization. The electricity provision of the country strongly relies upon hydroelectric sources, which make up for more than 50% of entire efficient capacity. The sources of geothermal energy represent 12.2% and the remaining 29.7% mainly consists of thermal generation based on oil. Kenya's solar energy and wind energy also contribute to Kenya's energy needs.

Hydropower potential has been drastically reduced due to the destruction of river basins. Climate changes can occur as extreme weather events, such as prolonged drought. This leads to power outages and high energy costs. The generation of hydroelectric energy is also influenced by soil attrition and the resulting sedimentation of the dams. Sedimentation is usually caused by heavy flooding, poor agricultural methods and deforestation. Scientists postulate a rise in the warmth of the earth, as global warming will be driven by the need for electricity for freezing products and air condition, whereas the expansion of agriculture for food will require more energy for irrigation. It includes the gradual reduction of biomass productivity and the supply of affected firewood.

Hydropower potential has dramatically reduced because of the degradation of river basins. Climate change is bound to make the situation direr, as it is adverse climatic occurrences, such as lengthy drought, that reduces water levels in dams. This leads to power cuts and high power costs. Hydroelectric energy production is also impacted by soil erosion and the resulting siltation of dams.

Sedimentation is usually caused by heavy flooding, poor agricultural methods and deforestation. Scientists postulate an increase in the world's surface temperature and due to

increase in temperatures there will be an increase in the need for electricity for services such as refrigeration and air conditioning, while the expansion of farming to meet food needs of enlarging populace will need increased energy for irrigation. Other effects of global warming on energy include the gradual reduction of biomass productivity, which affects the supply of firewood.¹¹⁵

Proposed Mitigation and Adaptation Measures in Kenya's Energy Sector is influenced by prevailing factors. Kenya depends mainly on biomass fuel that is mostly composed of fuelwood, coal and farm refuse. The largest portion biomass is utilized in rural homes and small enterprises. Various vital interventions have been: Managing river water utilization upstream, zero rate on renewable fuel innovations, promote the use of alternative energy sources such as solar, biomass, wind and biofuels; promote effective wood stoves, solar kitchens and LPG, with the relevant ministries tackling cost problems by granting subsidies or tax exemptions to poor families.¹¹⁶

e) Gender Roles in Climate Change

Gender alludes to dissimilarities in socially constructed duties and instances related with being a male or female and the exchanges and social interactions between the two. Therefore, gender decides what is anticipated, allowed and evaluated in the behavior of a female or a male in a specific setting. Capabilities, susceptibilities, and requirements are determined by gender. Female gender and male gender understand challenges differently based on assigned

¹¹⁵ Government of Kenya. *National Climate Change Response Strategy. 2010*. Ministry of Environment and Mineral Resources. pp 39-40.

¹¹⁶ Ibid. p. 55.

expectations. Women in developing countries tend to be more susceptible to crises such as the inevitable consequences of climate change.¹¹⁷

A large portion of ladies in poor states rely on farming. Notably, women generate more than half of global food supply; In Africa this figure goes up to 80%. Land ownership restrictions permit a very small number of females to obtain economic power on fertile farms. Desertification in ASALS subjects females to expend more time in search of fuel wood and water which hampers education and income generation.

Sustainable energy is paramount to the lessening of climate change whilst enhancing the livelihoods of women in under-privileged societies. Women and children are unduly open to the elements of indoor air pollution from burning wood and coal used for preparing meals and warming houses. Giving rural women right to use and regulate safe and renewable energy sources is critical to safeguarding against dangerous fumes and giving a chance to administer their own financial well-being.¹¹⁸

In the climate change talk, the gender perspective is the most appropriate to study climate change and gender imparities. Access to subsistence inputs is managed in African communities, so men and women probably have differing alternatives and safety nets to tackle climate change. To adapt and successfully mitigate the effects of climate change policies, gender issues need to be mainstreamed, for wholesome inclusivity of men and women at societal level.¹¹⁹

¹¹⁷ Eunice Ongoro and William Ogara. Impact of Climate Change and Gender Roles in Community Adaptation. *International Journal of Biodiversity and Conservation* Vol. 4(2), pp. 78-89. 2012. <http://www.academicjournals.org/IJBC>. p. 79.

¹¹⁸ Mike Shahanan, Willie Shubert, et al. UNESCO. *Series on Journalism Education. Climate Change in Africa: A guidebook for journalists*. France. 2013. pp. 19-20.

¹¹⁹ Eunice Ongoro and William Ogara. Impact of Climate Change and Gender Roles in Community Adaptation. *International Journal of Biodiversity and Conservation* Vol. 4(2), pp. 78-89. 2012. <http://www.academicjournals.org/IJBC>. pp. 83-84.

f) Impact of Climate Change on Kenya's Natural Environment

ASALs are prone to intermittent droughts which combined with over-exploitation of resources, lead to increased susceptibility to land degradation and desertification, which enhances greenhouse gas emissions risking livelihoods. The survival of the forest resources of Kenya is also immensely affected due to reduced rainfall and population pressure. The reduction in forest cover will affect downstream agriculture and hydropower generation.¹²⁰

In 2010, the Conference of the Parties to the UNFCCC approved a decision on reducing emissions from deforestation and forest degradation and on the conservation of forests, sustainable management and enhancement of forest carbon stocks, commonly referred to as REDD+. In Kenya, REDD+ has been planned as a countrywide system that will give positive incentives to achieve confirmed emissions reductions or carbon removals in forests.¹²¹

Enlargement and utilization of agricultural land affects trade-offs in the form of deforestation, destruction of grasslands and wetlands, and loss of biodiversity. The UNFCCC has been advocating for reduction of human interference on forests through creation and execution of country-wide action plans for 'reducing emissions from deforestation and forest degradation including conservation, sustainable management of forests and increasing forest carbon stocks in developing countries' (REDD+).¹²²

¹²⁰ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. p. 37.

¹²¹ Food and Agricultural Organization of the United Nations. *Climate Change Guidelines for Forest Managers*. FAO Forestry Paper 172. Italy. 2013. p. 16.

¹²² Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. p. 16.

Proposed mitigation and adaptation in Kenya's Natural Environment Sector comprise intense and continuous tree and forest rehabilitation programs by the Government, individuals, schools, private sector, multilateral organizations, and development partners. There are financial incentives to communities in rural areas to motivate the effective use of forest resources, creation of forest areas for firewood and other domestic uses, restoration of degraded sites and increased surveillance, promotion of species resistant to drought and pests among other interventions.

To reduce over-reliance and increasing pressure on natural forest resources, there is promotion of alternative livelihood systems, alternative energy sources, concerning forest-reliant rural communities in forest conservation, improving timber yields by using appropriate silvicultural practices, and forest fire prevention and management.¹²³ Forest personnel who require to give feedback on mitigation measures or those endeavoring to gain entrance to carbon markets through initiatives under the Clean Development Mechanism (CDM) or REDD+ have to scrutinize forest carbon. Kenya has several community groups that are engaged actively in carbon trading.¹²⁴

Considering the pessimistic predictions of climate change effects on farming productivity in Sub-Saharan Africa, climate-smart agricultural practices could likely profit the country. Kenya's Readiness Preparation Proposal (R-PP) singles out agriculture as a past

¹²³ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 54-55.

¹²⁴ Food and Agricultural Organization of the United Nations. *Climate Change Guidelines for Forest Managers*. FAO Forestry Paper 172. Italy. 2013. p. 66.

motive for deforestation through conversion of woodland to agricultural use, permitting livestock into forest reserves during drought and encouraging growing of cash crops.¹²⁵

Kenya has identified four priority areas through the REDD+ program which are: reducing pressure to clear forests for agriculture; motivating commercial tree growing on farmlands; educating livestock herders to enhance the quality of their livestock, decrease quantities and utilize enhanced management of grazing lands and giving farming inputs to poor and vulnerable forest adjacent communities in line with the government's National Accelerated Agricultural Inputs Access Program (NAAIAR).¹²⁶

3.4 KENYA'S RESPONSE TO CLIMATE CHANGE

Many adaptation and mitigation alternatives can tackle climate change, but no one option is adequate by itself. Effective execution is dependent on policies and collaboration at all levels and can be improved by consolidated responses that connect mitigation and adaptation with other social goals. Adaptation and mitigation reactions are based on general facilitating issues. These include efficient institutions and governance, innovation and investment in environmentally friendly technologies and infrastructures, sustainable livelihoods, and lifestyle and behaviour choices.¹²⁷

a) National Climate Change Response Strategy

In response to the obstacles and opportunities created by climate change, the Kenyan government initiated a national climate change response strategy that aims to: enhance

¹²⁵ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. p. 24.

¹²⁶ Ibid. pp. 24-29.

¹²⁷ Intergovernmental Panel on Climate Change (IPCC). *Climate Change Synthesis Report 2014*. World Meteorological Organization. Switzerland. 2015. p. 94.

understanding of the international climate change regime and, above all, Kenya's positions need to take maximize the beneficial effects, assess proof and effects of climate change in Kenya, suggest sufficient adaptation and mitigation measures required to minimize risks and maximize opportunities, enhance understanding of climate change, advocate for vulnerability assessment, impact monitoring and capacity building, suggest research and innovation needs, recommend an enabling policy, legal and institutional framework and facilitate a focused action plan and resource mobilization plan.¹²⁸

(b) Institutional Frameworks

The Climate Change Act 2016 establishes several key institutions pertinent to the governance of climate change as detailed below.

National Climate Change Council (NCCC) Chaired by the President and its secretary is the Cabinet Secretary in charge of environment and climate change affairs. It is the overarching national climate change harmonize mechanism responsible for, among others, ensuring the incorporation of climate change by national and county governments; direct implementation of NCCAP; advice the national and county governments on climate change issues, and administer the Climate Change Fund. Membership of the Council includes Cabinet Secretaries of the Ministries responsible for environment, energy, economic planning, and Treasury. Council of Governors, civil society, private sector and academia is represented.¹²⁹

¹²⁸Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp. 5-6.

¹²⁹ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 53.

Climate Change Directorate (CCD) is domiciled within the Department or Ministry responsible for climate change and it is headed by a Director of Climate Change. The CCD is the lead agency on national plans and actions and to deliver operational coordination.

Climate Change Fund (CCF) is vested in the national treasury; it is the mechanism to finance the actions and priority actions on climate change approved by the Council. The Council and the Principal Secretary in charge of climate change affairs will be responsible for its administration, to finance actions to mitigate and adapt to climate change and provide technical assistance to counties. Other institutions related to climate change planning include National Environmental Management Authority (NEMA) which monitors compliance with the Climate Change Act on behalf of the NCCC and the National Drought Management Authority (NDMA) which coordinates drought management and response efforts.¹³⁰

Kenya's Climate Change Fund (CCF) is in tandem with the Green Climate Fund established by the UNFCCC to give economic support to developing states to implement adaptation and mitigation actions. Voluntary carbon markets provide avenues by which farmers can trade carbon credits for carbon sequestered by their trees through afforestation and reforestation, forest restoration and avoided deforestation.¹³¹

(c) Kenya's Policy and Legislative Frameworks

Kenya's Constitution 2010 establishes several principles, rights and institutions which are relevant to and highlights its appreciation of climate change and sustainable development linkage. Some of the national values and principles of governance include sustainable

¹³⁰ Ibid. p. 54-55.

¹³¹ Food and Agricultural Organization of the United Nations. *Climate Change Guidelines for Forest Managers*. FAO Forestry Paper 172. Italy. 2013. pp. 16-17.

development, devolution of power, and public participation in decision-making. Respect for the environment as our heritage and its sustainable management for current and upcoming generations is well articulated. Article 42 states that everyone has the right to a clean and safe environment and includes the right to have the Mother Nature safeguard for the benefit of current and future generations. Section 69(b) obligates the State to achieve a tree cover of at least ten per cent of Kenya's land area, a mitigation action with adaptation benefits.¹³²

Subsequently, some of the functions which have been devolved to the counties include agriculture; control of air pollution; and enactment of particular national government policies on natural resources and environmental conservation such as soil and water conservation and forestry. Agricultural policy, disaster management, and protection of the environment and natural resources are retained by the national government.¹³³

Vision 2030 aims to transform Kenya into a country of industrialization and average income that provides a quality life for its citizens in a clean and safe environment through 2030. It is intended to attain the Sustainable Development Goals (SDGs) with projects addressing the SDGs in key sectors. Medium Term Plan (MTP) I and MTP II which cover the period from 2007 to 2017 have identified climate change and high dependence on rain-fed agriculture as critical challenges. It proposes adoption of climate-smart agriculture (CSA), development of a comprehensive National Green Economy Strategy, and integrating the SDGs into its planning and activities.¹³⁴

¹³² Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. pp. 38-39.

¹³³ Ibid. p. 39.

¹³⁴ Ibid. p. 38.

The Climate Change Act 2016 provides a regulatory framework for the creation, administration, operation and directive steps to improve climate change hardiness and low carbon increase for long-lasting development in Kenya. It is intended to, among others, mainstream climate change interventions into development scheduling and implementation; build resilience and adaptive capacity; and provide incentives for achievement of low carbon climate resilient development, promotion of sustainable development, equity and social inclusion, and public participation and consultation. All public entities are to incorporate the National Climate Change Action Plan (NCCAP) into sector plans and procedure, give feedback on sectoral GHG emissions for the country's register; assign a unit and select a leader to direct mainstreaming, and annually report to the Council the position and development of performance of their climate change assignments and targets.

The Land Act 2012 sets up the National Land Commission, whose duties include classification of ecologically susceptible regions and taking action to avoid the degrading of the environment and climate change in those locations. The stipulation gives credence to climate-smart agriculture, notwithstanding on public lands.

The Environmental Management and Co-ordination Act 1999 (EMCA)/ revised edition 2012 sets up the overall principles for environmental conservation within Kenya to be maintained through systems and procedures. It gives guidelines for sustainable use of hilly terrains, proper agricultural practices and steps to arrest soil attrition all of which are essential for climate-smart agriculture.¹³⁵

¹³⁵ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. pp. 49-50.

The National Environmental Management Authority (NEMA) is to oversee compliance with the Act. County Governments are to merge and establish climate change actions outlined in the Act and NCCAP into various sectors, the County Integrated Development Plan, and the County Sector Plans. The Governor is to appoint a County Executive Committee member to correlate climate change matters. The NCCAP and any other climate change policy is to be tabled in Parliament. This tabling is a positive step as it will ensure that climate change issues are canvassed at the legislative and oversight arm of government.¹³⁶

Kenya's National Climate Change Response Strategy (NCCRS) has been formulated to combat effects of climate change through institutional frameworks and engagement of all stakeholders to foster nationwide concentrated actions towards adaptation and mitigation measures. NCCRS has prioritized the most susceptible sectors of the economy, namely agriculture and food security, water, forestry, pasture, health, social and physical infrastructure.¹³⁷

The National Environment Policy suggests measures to tackle degradation of the ASALs, such as: formulation and execution of an encompassing Land Use Master Plan; water harvesting; enhancing an encompassing natural resource administration; and effective adaptation actions for resource management. In regard to land matters, the National Environment Policy spells out the need to guarantee sustainable farming and develop a National Soil Conservation Action Plan to sustain soil fertility.¹³⁸

¹³⁶ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. pp. 46-47.

¹³⁷ Government of Kenya. *National Climate Change Response Strategy. 2010*. Ministry of Environment and Mineral Resources. p. 44.

¹³⁸ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. p. 42

The National Policy for the Sustainable Development of Northern Kenya and other Arid Lands seeks to enhance development among the largely pastoralist communities and ensure food security across the ASALs. Some proposed climate change actions include gazetting and managing crisis drought reserve areas and support development of buffer areas of crop and forage production as part of emergency preparation. In Baringo County, prosopis plant, which is an invasive species, has been harnessed in charcoal production to benefit the communities whilst preventing soil erosion and regulation of the climate.¹³⁹

The National Climate Change Action Plan (NCCAP), highlights the benefits, justification, and priority actions to be undertaken in the transition to a low carbon climate resilient development. Sustainable development is expressly set as the overall aim since climate change and development are considered intricately linked. The NCCAP states that "In Kenya, low carbon actions should be considered as priority actions only if they also have climate resilience or significant sustainable development benefits." This means that mitigation actions will be prioritized if they also contribute significantly to the broader sustainable development goal.¹⁴⁰

The draft of the Strategic and Implementation Plan for the Kenya Green Economy (GESIP) provides the general framework to facilitate the transition to the green economy and describes the need to integrate and align green economy initiatives in the economic, social and environmental spheres of society towards a globally competitive low carbon growth path. Operationalizing the proposal in MTP II, it is seen as an avenue for functional interaction between the economy and the SDGs. GESIP will be embedded in County

¹³⁹ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 40-41.

¹⁴⁰ Ibid. pp. 41-42.

Integrated Development Plans (CIDPs) as well as sector plans linked to the annual budget process through the Medium-Term Expenditure Framework (MTEF).¹⁴¹

The 2015-2030 National Adaptation Plan is the basis of the adaptation component of the planned Kenya contribution (INDC) expected at national level. Its goal is to improve synergies between adaptation and mitigation actions in order to achieve a climate resilient to low-carbon climate economy.¹⁴²

The draft National Climate Change Framework Policy 2016 has already been approved by Cabinet, the aim is to boost adaptive capacity and resilience to climate change and promote low carbon development. Adaptation is covered under climate resilience and adaptive capacity, while mitigation is dealt with under low carbon growth. Mitigation benefits are seen through green economy including green jobs, forests' ecosystem services' contribution to economic development, and positive health implications of reduced air pollution.

Further, an integrated, holistic and adequately resourced monitoring, reporting and benefit measurement system or mechanism will be put in place to track adaptation and mitigation actions, impacts and benefits, as well as finance. The National Climate Change Framework Policy 2016 further outlines that the Government will put in place a framework for tracking sources, application and impacts of climate finance.¹⁴³

The Crops Act 2013 establishes sustainable and environmentally friendly production as the standard for all land cultivation. It outlines the role of County Governments in soil and water conservation as well as the duties of the Agriculture, Fisheries and Food Authority.

¹⁴¹ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 45.

¹⁴² Ibid. p. 47.

¹⁴³ Development and Climate Change Nexus: The Case of Kenya. UNDP FAO Working Paper. 2017. p. 48.

The provisions requiring farmland users to cultivate and make the land economically productive in a "sustainable and environmentally friendly manner" could support uptake of climate-smart agriculture because climate-smart agricultural practices are intended to increase productivity whilst supporting sustainable agriculture.¹⁴⁴

3.5 Climate Change and Human Development in Kenya

The International Community Plays a big part in providing adaptation and mitigation measures especially to third world countries. They also provide funding to third world countries to assist in providing alternative livelihood activities to communities so that they do not interfere with the forests. The International Community has also done a lot in supporting various states and countries to mitigate against the adverse impacts brought about by climate change.

One instance of the above is the JICA Project in Kenya that is sensitizing and training farmers through Farmer Field Schools (FFS) on best practices that do not involve forest destruction. These include; bee keeping, fruit orchards among others. The international community has also among others provided technological measures that are intended to assist countries conserve their forests. These include a National Forest Monitoring System.¹⁴⁵

Forest monitoring systems include measurement, reporting and verification (MRV) functions that aim to produce high-quality, reliable data on forests, including forest-carbon estimates, that are critical to the battle against climate change caused by deforestation and degraded forests. When it comes to climate action, effective measurement, reporting and verification (MRV) of emissions and emissions reduction is vital in helping countries

¹⁴⁴ Elizabeth Dooley, Dr. Sophie Chapman. *Climate-smart agriculture and REDD+ implementation in Kenya*. University of Cambridge. United Kingdom. 2014. pp. 42-43.

¹⁴⁵ Interview with Mr. Mihaelu Secieru, Technical Advisor REDD+, UNEP on 5th April 2018.

understand GHG sources and trends, design mitigation strategies, improve credibility and take other policy actions.¹⁴⁶

According to development partners, Kenya is progressing in its efforts to mitigate the effects of climate change. However, more requires to be done especially in the agricultural sector, since most of the communities are turning forest land into agricultural land. This is very risky for the country since with time all forest land will become bare hence unpredictable weather patterns leading to poor food security. Because of this, Kenya has a long way to go since the country needs to grasp new technological measures in conserving forests. For instance the country needs to actualize the Geographic Information System (GIS) to assist in conserving forests in the country. Other countries like Tanzania and Uganda are way ahead since they have been able to adopt these technologies.¹⁴⁷

Kenya is still in the Readiness stage and still has no REDD+ Strategy. Other countries like Tanzania and Uganda has made great strides in that they already have a REDD+ Strategy. Deforestation is a universal concern. Further than its negative effects on flora and fauna and the source of income for forest adjacent communities, it is a key cause of climate change and makes up for approximately a fifth of worldwide greenhouse gas emissions. Hence Kenya should look to have a REDD+ Strategy that will provide a roadmap and solutions for mitigating against effects of climate change.¹⁴⁸

For Kenya to improve its handling of climate change issues, the main focus should be to improve livelihoods of communities especially the ones living around forests. Once this is

¹⁴⁶ Interview with Mr. Mihaelu Secieru,

¹⁴⁷ Interview with Mr. Kei Sato, Forest Remote Sensing and GIS, JICA on 7th April 2018.

¹⁴⁸ Interview with Mr. Mihaelu Secieru, Technical Advisor REDD+, UNEP on 5th April 2018.

done, forests in Kenya will be safe and hence the country will not be faced by the detrimental impacts of climate change. UNDP is working with the Kenyan Government to establish climate change responsive implements for knowledgeable planning on a countrywide and county level. In line with to the County Government Act, 2012, counties are expected to prepare GIS based County Spatial Plans (CSP) to inform their long-term development programme. These plans and agendas will be instrumental in providing adaptation and mitigation measures.¹⁴⁹

Climate change is a geographic problem whose effects have become more pronounced in recent years, hence Kenya should look to adopt technological measures aimed at protecting the environment more so forest areas. Key among it include adoption of GIS technology which is useful for understanding the environment, in strategic decision making and climate change monitoring as it provides geospatial solution to climate change.

Development partners recommend that Kenya should look to have a REDD+ Strategy in place as soon as possible, the strategy has in it many solutions to climate change. In this regards, the Reducing Emissions from Deforestation and forest Degradation (REDD+), and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries has a key purpose to mitigate climate change by dropping net emissions of greenhouse gases through improved forest management.

The extent to which climate change has an impact on human development would majorly be on agriculture. Kenyans especially rural dwellers continue to yield poor harvest due to the detrimental impacts of climate change. Weather patterns have not been consistent

¹⁴⁹ Interview with Mr. Kei Sato, Forest Remote Sensing and GIS, JICA on 7th April 2018.

any more hence interfering with crop yields. This has in turn caused drought, hunger and even in some cases death of Kenyans. Hence the government should look to provide alternative livelihoods to communities to discourage them from converting forest land into agricultural land.

Climate change is internationally recognized as one of the most considerable developmental challenge affecting human beings. There is an increasing proof that climate change is unswervingly touching societal, financial and human development. Development partner's note that the impacts of climate change and associated catastrophes have the capacity to harmfully affect many citizens considering approximately 75% of the populace relies directly on land and natural resources for their upkeep.

These severe events have had unhelpful societal and financial effects on roughly all sectors in Kenya such as health, agriculture, livestock, environment, hydropower generation, and tourism. The gravity of the predicament has made it crucial for policy makers to begin to factor climate change in development policies and strategies. Agriculture has been the most affected by the impacts of climate change in Kenya putting food security in jeopardy. Pastoral communities have also continued to suffer.¹⁵⁰

The key lessons Kenya can learn from other developing countries include aligning of key policies and strategies to climate change. Kenya should look to incorporate climate change in most of if not all policies. It is commendable that the country has a Climate Change Response Strategy and Climate Change Action Plan. The only challenge now lies in the implementation of these strategies, policies and action plans. Like other countries Kenya

¹⁵⁰ Interview with Mr. Kei Sato, Forest Remote Sensing and GIS, JICA on 5th April 2018.

is expected to implement all these to the letter. Kenya should also look to adopt technological smart measure for environmental conservation.

Kenya and JICA have collaborated in the environment and natural resources sector for more than three decades. JICA's support for KEFRI and KFS in the part of communal forestry, building of physical amenities at KEFRI, encouragement of the growing of famine tolerant tree species such as *Melia Volkensii* and support for resilience and food security issues in Turkana and Marsabit are examples of the many projects and programmes that JICA has supported over the years. Kenya should look learn and adopt this kind of measures in future from developed countries to avoid effects of climate change.¹⁵¹

International treaties and conventions on climate change are relevant and those which Kenya has ratified contribute to enhancing human development. This includes the United Nations Framework Convention on Climate Change (UNFCCC) whereby Kenya submitted its new climate action plan to the UN Framework Convention on Climate Change (UNFCCC). Hence this puts Kenya in a good position to benefit from donors, development partners like the World Bank. UN REDD Programme is the other agreement on improving community livelihoods among other development activities including technological advancement on environmental matters. These treaties have provided key measures such as climate smart agriculture which if adopted by Kenya will benefit rural dwellers to have proper and timely yields. This will keep the country from the verge of disasters such as drought, hunger and death of human beings and livestock.

¹⁵¹ Interview with Kazuhisa Kato, National Forest Monitoring Systems, JICA held on 7th April 2018.

The Government of Japan through the Japan International Cooperation Agency (JICA) is in the process of supporting the country develop the National Forest Monitoring System (NFMS) and establishing a Forest Reference level (FRL) for REDD+, a project that will be ongoing for four years. This in the long run will help Kenya develop a REDD+ strategy. *REDD+* is a set of policies designed to stop climate change by driving more funding into forest protection. Hence Kenya should fast track finalization of the REDD+ strategy so that it may start benefiting.¹⁵²

According to senior Government officials in the Ministry of Environment and Forestry, the country has made necessary steps in domesticating climate change in Kenya through setting up legal and policy environment to set out clearly how to tackle the climate change issues. However this may not be quickly achieved if adequate finances are not availed. The issues of community participation and indigenous peoples should be well articulated in the climate change projects or interventions.¹⁵³

Climate change is real and a major challenge at local, national, regional and global level .The risks associated with climate change will influence the achievements of the SDGs and the national development agendas. Climate change affects the key sectors of the Kenya's economy such as agriculture, industry, mining, energy, tourism manufacturing and forestry. The climate system is highly complex, as are the human institutions that are affected by and that must respond to climate change.

¹⁵² Interview with Kazuhisa Kato, National Forest Monitoring Systems, JICA held on 7th April 2018.

¹⁵³ Interview with Alfred Gichu, National REDD+ Coordinator, Ministry of Environment & Forestry on 10th April 2018.

Pertinent issues that need to be addressed include understanding the impacts of climate change on human and natural systems and how various sectors respond to climate change impacts, Mainstream adaptation and mitigation into core development work in the country, financial support for climate change response in the Kenya, developed technology and facilitate adoption in the country.

The country has adequate human resources to design and implement climate change projects in the country. The food insecurity caused by climate change impacts on the health and well-being of the population and therefore there is need for paradigm shift to diversify on the food supply base for the currently in response to effects of climate change .Additionally, climate change has led to increased incidences of diseases with studies showing prevalence of areas that previously had no cases of malaria.¹⁵⁴

In addition, Kenya's HDI value was about 0.56 in 2015 which positions Kenya in the medium human development category. Between 1990 and 2015, Kenya's HDI value increased from 0.473 to 0.555, an increase of 17.3 percent. Climate change is considered as one of the critical development challenge facing the global sphere. There is growing proof that climate change is unswervingly touching human development in Kenya. Addressing climate change should therefore be one of the key national development priorities.

To address this phenomena, the government has a response strategy that articulates how the various sectors are addressing climate change issues. There are both Climate change adaptation and climate change mitigation action plans that details the interventions per sector

¹⁵⁴ Interview with Alfred Gichu, National REDD+ Coordinator, Ministry of Environment & Forestry on 10th April 2018.

and as well working towards the achievement of the National Determined Contribution (NDC) towards the Paris climate agreement.¹⁵⁵

Kenya is a party to the UNFCCC and has ratified all the necessary agreements including the latest Paris Agreement. Kenya has developed several policy documents and strategies to provide an enabling environment for implementation of climate change activities. This includes the Climate change Act 2016, Climate change Policy framework, National Climate Change Strategy and Action Plan National adaptation Plan and the NDC. Climate change Directorate has been established and each sector has a climate change unit supported by the exchequer. All ministries and MDAs are developing sectoral strategies to mainstream climate change response¹⁵⁶

Kenya in response to climate change has ratified the Climate change agreements that include: Kyoto protocol, Paris climate agreement, Bonn challenge, Aichi CBD targets, UN Forest, AFR100 and UN Framework Convention on Climate Change. Kenya is a party to the UN Framework Convention on Climate Change (UNFCCC) and participates in ongoing negotiations under the UNFCCC. The country is also a signatory to the UN convention on combating desertification and reclaiming degraded land (UNCCD) and Convention on Biological Diversity (CBD). The Stockholm Convention on Persistent Organic Pollutants (POPs) protects human health from harmful organic chemicals and Kenya is a signatory.¹⁵⁷

¹⁵⁵ Interview with Alfred Gichu, National REDD+ Coordinator, Ministry of Environment & Forestry on 10th April 2018.

¹⁵⁶ Interview with Rose Akombo, Climate Change Response Programme, Kenya Forest Service, held on 10th April 2018.

¹⁵⁷ Interview with Rose Akombo, Climate Change Response Programme, Kenya Forest Service, held on 10th April 2018.

Challenges include slow process of mainstreaming the climate change issues in the planning processes such as fiscal plan, County Integrated Development plan(CIDP); monitoring, reporting and verification; financing the action plans have taken time to be developed and adopted, inadequate financial resources, inadequate capacity, limited political goodwill due to lack of awareness.

The private sector can support climate change interventions by providing the financial support to the implementation of climate change related interventions. Development and adoption of climate smart technologies. Investment in climate smart technologies includes; Mainstreaming climate change in investments and business planning; Reducing GHG emissions and carbon footprint from business investments; Support CSR activities in the rural communities; provide weather insurance and invest in climate proofing ventures.

The public sector can support climate change initiatives by: Creating an enabling policy environment; Facilitate climate vulnerability assessments; Climate financing and governance; Capacity development and stakeholder engagement in climate change debate; Disaster management¹⁵⁸

The Legislative frameworks detailed in this chapter provide strategic direction for sector -oriented adaptation approaches that recognize the roles of National and County government structures. In addition, the National Treasury has established a Carbon Finance desk for development of carbon finance and emissions trading national policy. The National Treasury is also allocating funds for advocacy and awareness forums on carbon financing, it has developed a climate change financing mechanism and a carbon trading platform. The

¹⁵⁸ Interview with Alfred Gichu, National REDD+ Coordinator, Ministry of Environment & Forestry on 10th April 2018.

National Treasury is also enforcing regulatory instruments, fiscal incentives for making climate related investment more attractive.¹⁵⁹ The Ministry of Devolution and Planning is responsible for County Integrated Development Plan, which includes guidelines for mainstreaming Climate Change.

Adaptation measures which are being implemented by Government Ministries and Counties include agroforestry, conservation tillage, growing drought-resistant crops, increasing tree cover, restoring and protecting water towers, improving waste management systems, mainstreaming climate change in infrastructural developments/ green buildings, developing renewable energy sources such as jatropha bio-fuel, enhancing industrial efficiencies, improved disease surveillance, and, improved access to water and sanitation.

Despite the progress in addressing climate change there is need to effectively pool together all stakeholders in Government and County governance structures to collectively address the imposed threats and risks, plan ahead and adapt to the impacts.¹⁶⁰

3.6 Government Ministries and Counties Interventions in Climate Change

The Government of Kenya recognizes the importance of tackling climate change to enhance human development and has come up with initiatives that are guided by the Constitution, to conserve and sustainably manage the environment while promoting development. The Constitution identifies sustainable development as an important value and principle of governance and grants the right to a clean and healthy environment to all citizens. Sustainable development is entrenched in Vision 2030 whose key goal is attainment of a

¹⁵⁹ Prof. Daniel Olago. *Kenya: Climate Change Impacts, Vulnerability, Mitigation and Adaptation Strategies*. Institute for Climate Change & Adaptation (ICCA) and Department of Geology. University of Nairobi. Kenya. p. 15.

¹⁶⁰ Prof. Daniel Olago. *Kenya: Climate Change Impacts, Vulnerability, Mitigation and Adaptation Strategies*. Institute for Climate Change & Adaptation (ICCA) and Department of Geology. University of Nairobi. Kenya. pp. 15-19.

sustained economic growth of 10 per cent per annum and creation of a just, cohesive and equitable social development in a clean and secure environment.¹⁶¹

Various Government Ministries have a responsibility to initiate green development projects. The Ministry of Lands, Housing and Urban Development is responsible for sustainable infrastructure that cuts across various sectors. To reduce negative impacts on ecological processes, the Ministry is expected to ensure sustainable design, construction and maintenance of buildings while incorporating climate proofing. In addition, the Ministry is expected to enhance water and sanitation services at national and county levels, promote bio energy in infrastructure and implement certification standards for green buildings.

The Ministry of Energy and Petroleum is responsible for increasing national energy efficiency by enhancing clean and renewable energy, responding to new technology, developing energy efficient audits, equipment testing and certification, adopting minimum energy efficiency for lighting and industrial products among other functions.

The Ministry of Water and Irrigation is responsible for sustainability guidelines at national, county, basin and sector level. The Ministry is responsible for reducing water footprints, reviewing water charges to enhance a culture of efficiency, streamlining water sector coordination challenges between national and county governments and waste management.

The Ministry of Education, Science and Technology has a responsibility to mainstream learning of climate change and environmental matters in all education and training through a policy on Education for Sustainable Development. The Ministry has

¹⁶¹ Government of Kenya. *Green Economy Strategy and Implementation Plan 2016-2030*. 2016. Government of Kenya. p. 5.

accelerated recruitment into Technical, Vocational and Educational Training Centers who are expected to support green business and green innovation developments.¹⁶²

The Government is also embedding green policies in County Integrated Development Plans, Sector plans linked to annual budget processes and the private sector is also expected to be vital in adopting green technologies and practices. Counties have allocated up to two percent of their development budgets to climate change for actions that include tree growing, creating tree nurseries, creating awareness, providing other energy sources such as biogas and solar, solid waste management and energy recycling, planting drought-resistant grass for livestock, water harvesting, conserving catchments and springs, promoting agroforestry, climate proofing infrastructure, among numerous other activities. Counties have also reported they are in various stages of preparing and finalizing bills on environment, water and natural resources and action plans which address climate change.¹⁶³

3.7 Conclusion

This chapter has analyzed the various policies and legislations that guide climate change interventions, including government departments in charge of climate change. The role of agriculture, energy, livestock, water and other sectors has also been analyzed including the general impact of climate change along gender lines.

¹⁶²Government of Kenya. *Green Economy Strategy and Implementation Plan 2016-2030*. 2016. Government of Kenya. pp. 20-28

¹⁶³ Ministry of Environment and Forestry. *Report on Meeting with County Government Climate Change Representatives*. www.kccckp.go.ke/download/nccap/downloads/7._county-climate-change-Reps-Meeting-Repor_11may2018.pdf. Accessed on 19th September 2018.

It is evident that there is lack of cooperation amongst various government Ministries as regards climate change interventions. Although various strategies are being implemented by various ministries, the success rate or lack of thereof is not evident, because there is lack of necessary data to track progress of climate change interventions in the country.

CHAPTER FOUR

DATA ANALYSIS AND RESEARCH FINDINGS

4.0 Introduction

The previous two chapters gave a detailed analysis of the state of human development in Kenya and climate change discourse in the country. Human development and how it has been influenced by human security, environment, gender, development planning, food security and Kenya's land tenure system is analysed in chapter two. Chapter three looks at the policies, laws and regulations, strategies and institutional frameworks that govern climate change and impacts on Kenya's water resources, agriculture, environment, energy and the adaptation and mitigation measures that have been ongoing in each sector including gender roles.

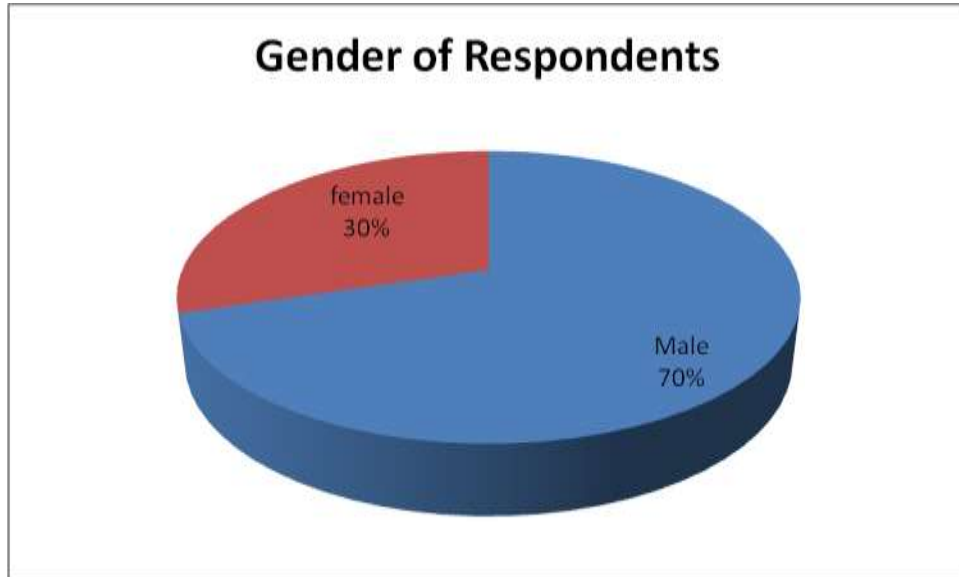
Subsequently, this chapter explains the examination of information and a dissertation of the study result. The results communicate to the study questions that guided the research. Data was analysed to discover, explain and investigate the connection between climate change and human development. Information was obtained from self-administered questionnaires, completed by climate change experts from various sectors including Government, NGOs and Development Partners.

The questionnaire comprised of two sections and data obtained is presented as follows: The first section comprises of demographic data such as gender, age, education level and affiliation and years of experience in climate change and human development matters. The subsequent segment consists of data recounting knowledge on the various climate change legislations in the country, and proposed best mitigation and adaptation measures which can be undertaken by the government and various stakeholders.

4.1 Methods of Data Analysis and Presentation of Data

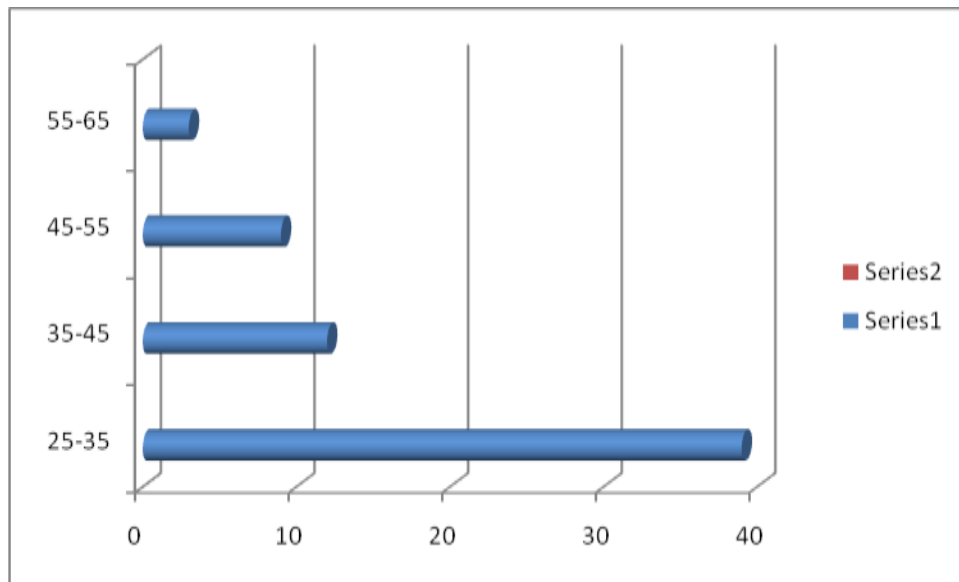
Descriptive statistical analysis was used to identify frequencies and percentages to answer all of the questions in the questionnaire.

1. Gender



70 % of the respondents were male while 30% of the respondents were female

2. Age of the respondents



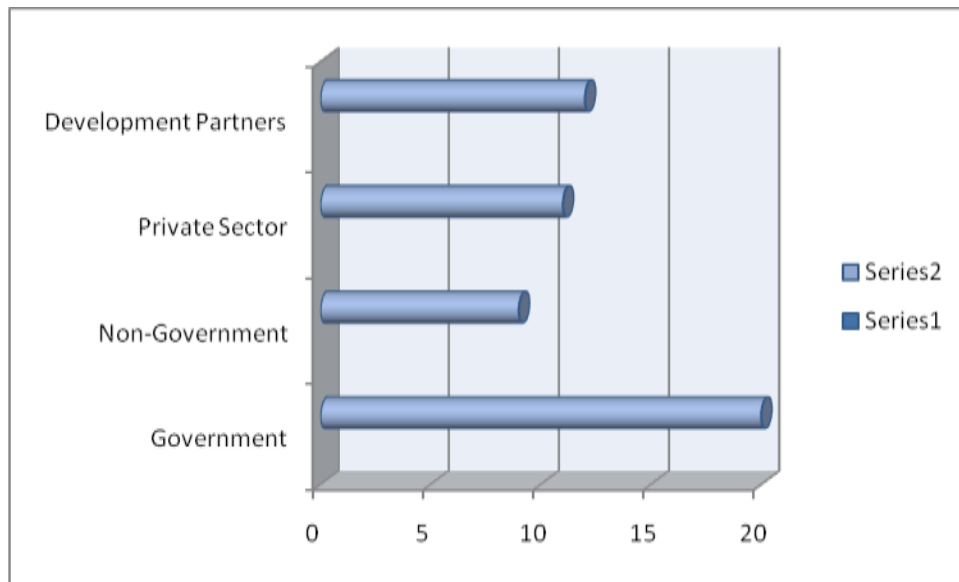
70% of the respondents were between the ages of (25-33), 6% between the ages of (35-45), again 6% between the ages of (45-55) and 3% between the ages of (55-65).

3. Education level



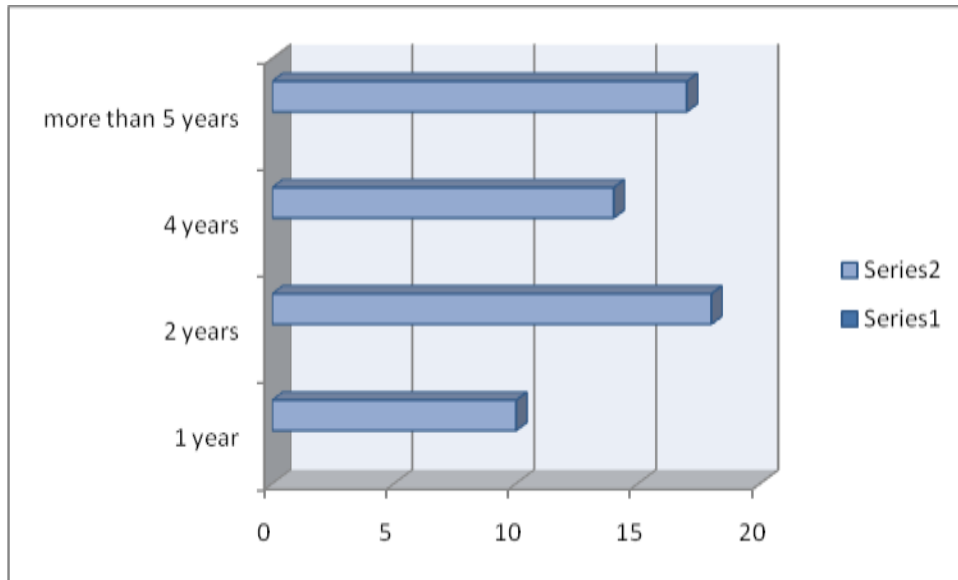
46% of the respondents had attained a Master degree while 36% had attained a Bachelor's degree, while 6% had attained a PHD.

4. Affiliation of the respondents



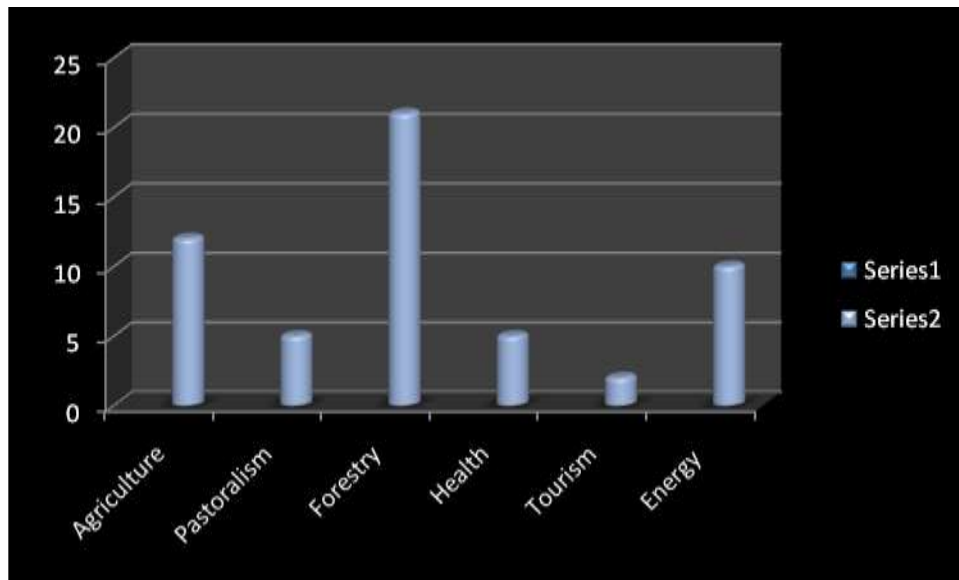
56% of respondents were from Government institutions including *Kenya Forest Service (KFS)* and the *Climate Change Directorate (CCD)*. 6% from Non-Government institutions including *World Resource Institute (WRI)*. 3% from the private sector and 16% were Development Partners including experts from the *Japan International Cooperation Agency (JICA)* & *UNEP*

5. Respondents ,years of experience in Climate Change issues



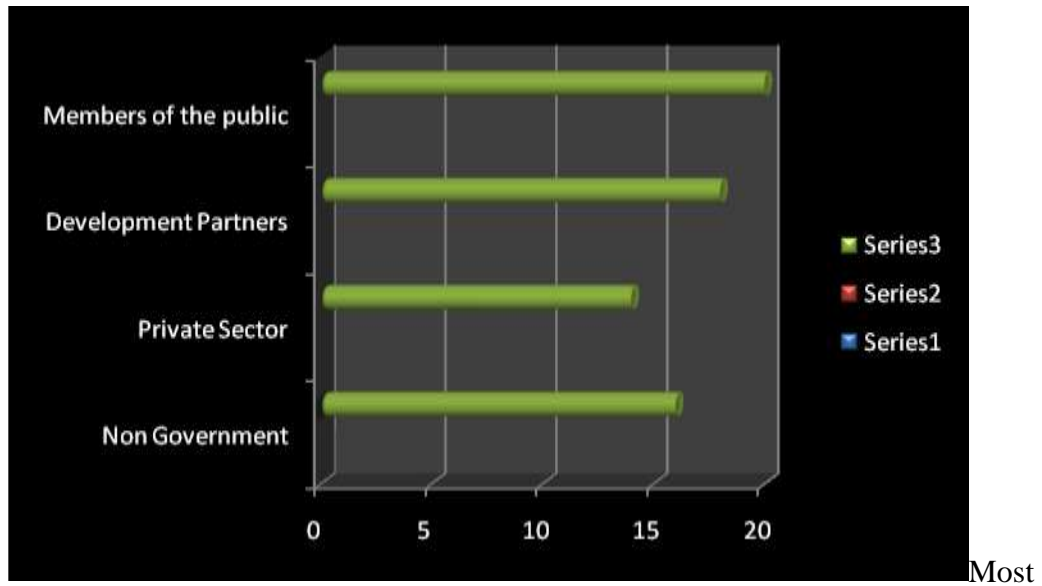
23% of the respondents have more than five years' experience in climate change matters. 26% have four years' experience, 16% have two years' experience while 33% have one year experience.

6. Respondents knowledge on human development sectors



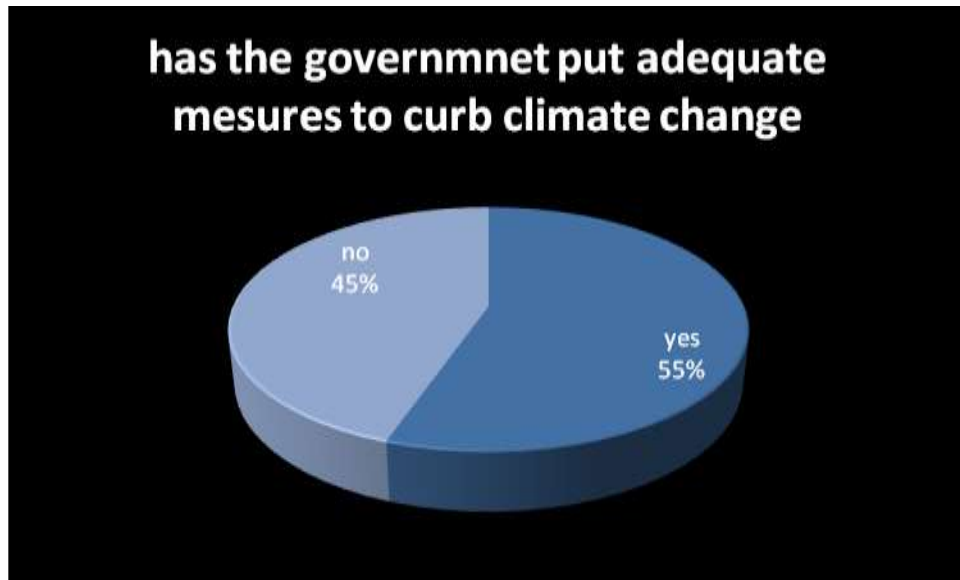
53% of the respondents have adequate knowledge on forestry matters, 26% have adequate knowledge on the energy sector, 6% have adequate knowledge on matters health, and 10% have knowledge on agricultural matters while 3% have adequate knowledge on pastoralism.

7. Most important players the government should engage in climate change & mitigation



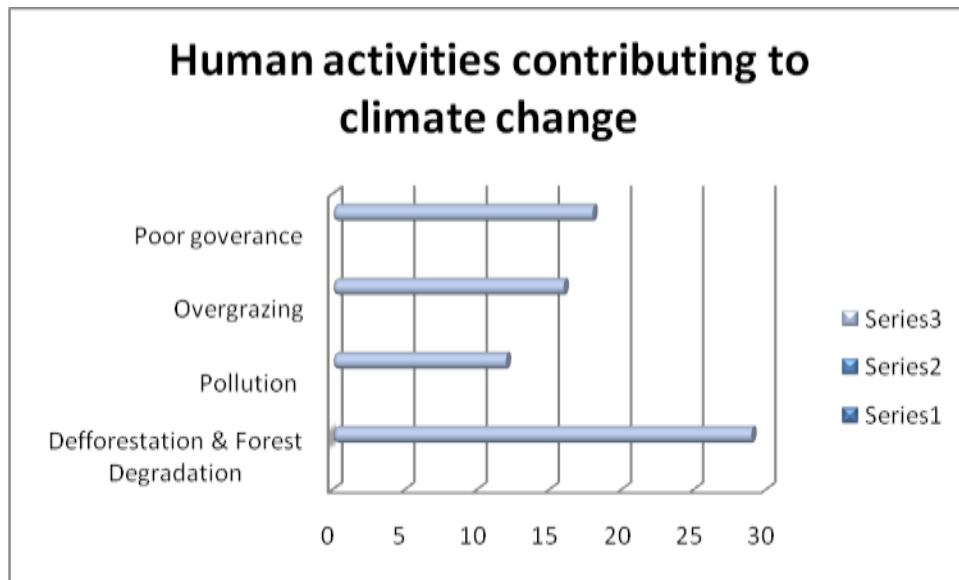
respondents feel that *members of the public* should be engaged most on climate change mitigation and adaptation issues

8. Has the Government put in place adequate measures to curb adverse effects of Climate Change



55% of the respondents feel that the Government has done or is doing enough to curb the adverse effects of climate change while 45% feel the Government is not doing enough.

9. Human activities contributing most to effects of climate change in Kenya.



Most respondents feel that *forest degradation and deforestation* is the root cause of the adverse effects of climate change.

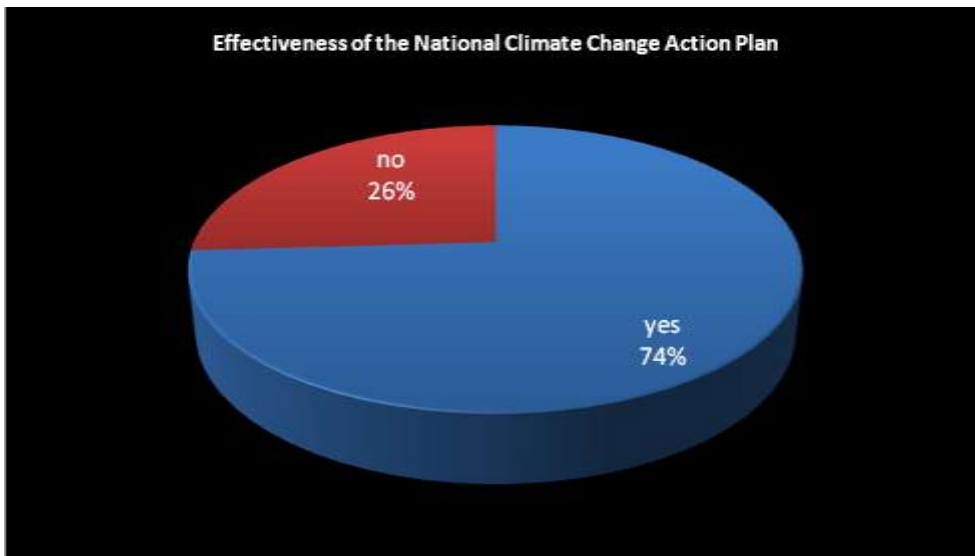
10. Approaches the Government should use to mitigate the effects of climate change

According to the respondents, the following are the approaches they propose;

- Adoption of the REDD+ process in Kenya fully.
- Sensitize and create awareness to the general public about the adverse effects of climate change.
- More policies and laws on climate change should be developed.
- Build the capacity of communities towards climate change.
- Increase forest carbon sinks.
- Good governance including policy enforcement.
- Increase the forest cover outside gazetted forests.
- Embark on transformative high impact projects.

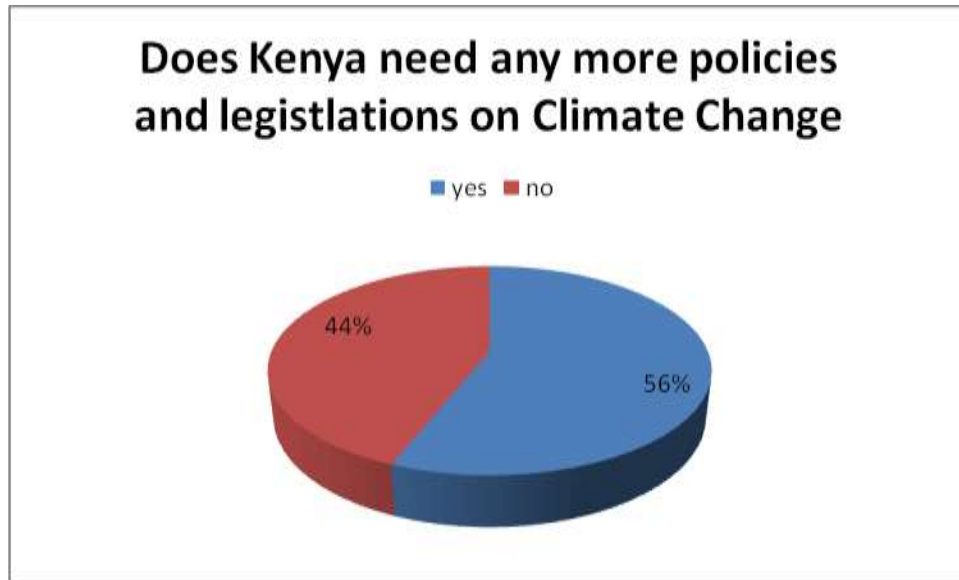
- Put in place strict pollution laws to restrict industries from polluting rivers like Nairobi.
- Offer incentives to the public to shift to clean energy.
- Achieving constitutional threshold of 10% tree cover.
- Climate Change awareness campaigns.

11. Does the recently launched National Climate Change Action Plan (2018-2022) provide proper mitigation and adaptation measures



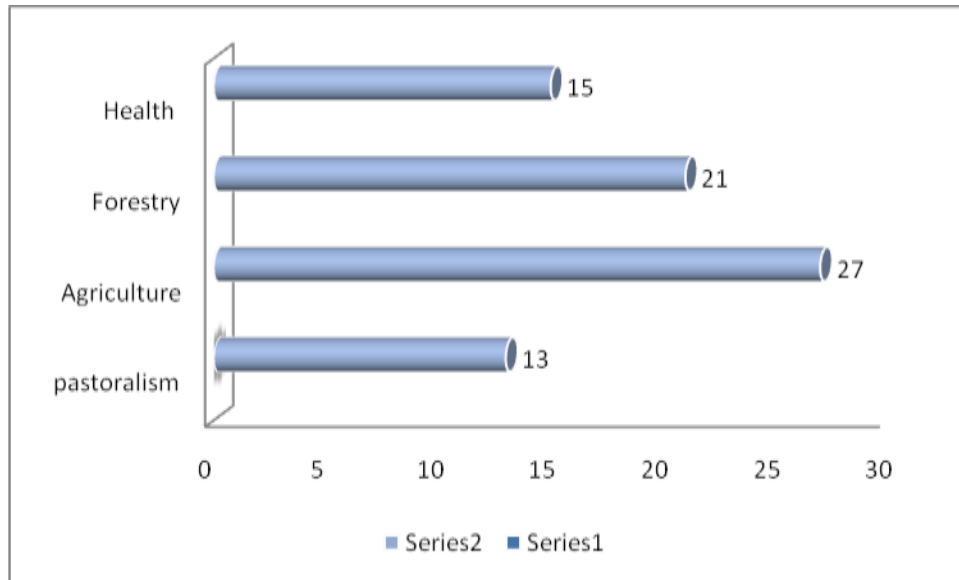
74% of the respondents think that the new action plan has provided for proper mitigation and adaptation measures while 26% feel it has not provided the best measures.

12. Does the country require more policies and legislations on climate change



56% feel that the Country requires more policies on climate change while 44% feel that the already existing policies are enough.

13. Sector of human development that have been severely affected by Climate Change

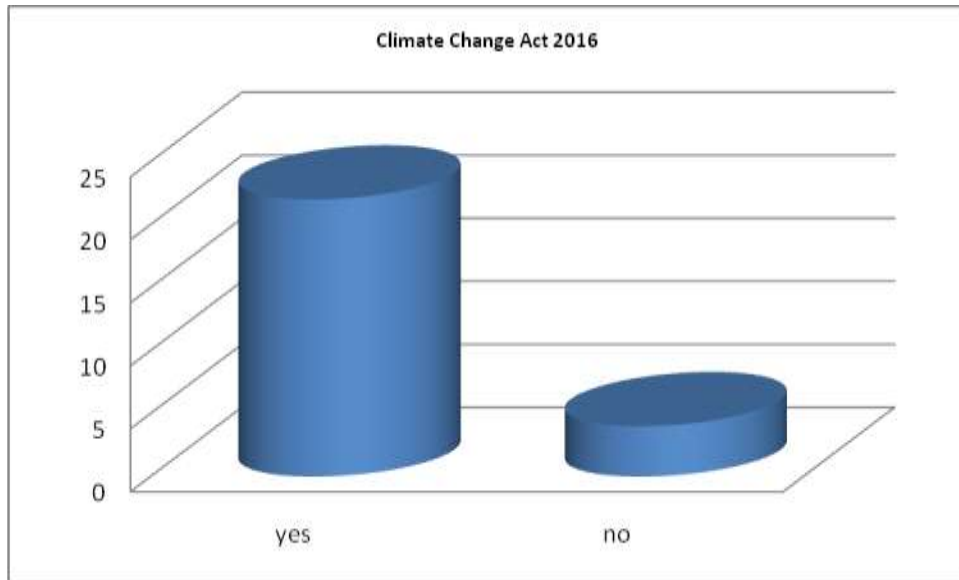


According to the respondents the *agricultural sector* is the hardest hit by the adverse effects of climate change.

14. Ways the government should involve members of the public on climate change mitigation and adaptation;

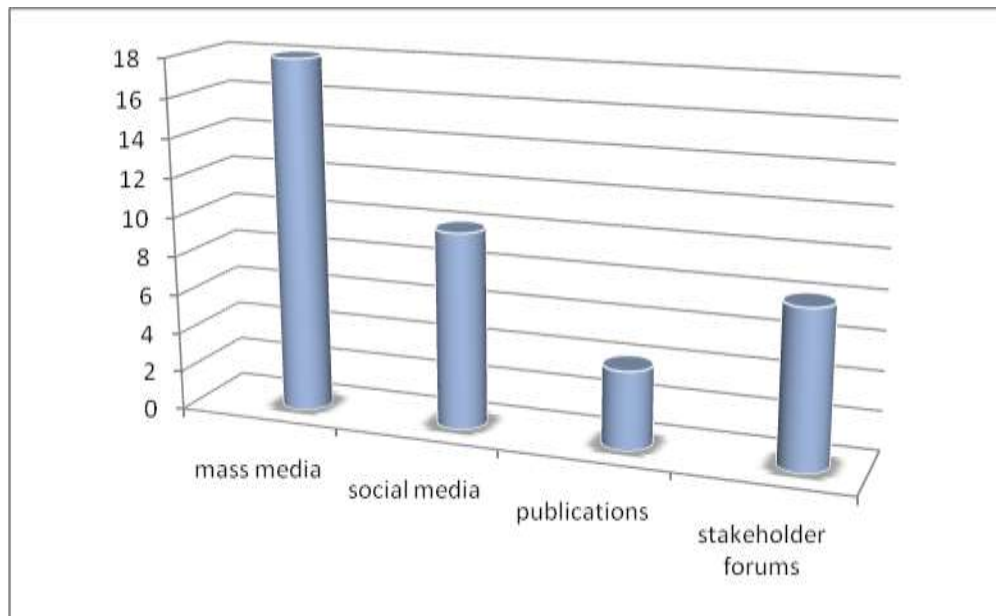
- Public awareness and capacity building at grass root level
- Knowledge management
- Create voluntary measures with incentives for propelled action by individuals
- Sensitization and establishment of projects geared towards reduction of greenhouse gases.

15. Does the Climate Change Act of 2016 provide for a smooth running of issues in the country`s climate change sector



73% feel that the Climate Change Act of 2016 is up to the task while 13% feel that the Act needs to be amended.

16. Most effective methods the government should use to enlighten members of the public on climate change



Most of the respondents feel that *mass media* (i.e. *TV, Radio*) is the best channel to reach out to members of the public to enlighten them on climate change matters.

17. Key measures and interventions the Government could borrow from other successful countries to curb adverse effects of climate change

- Enforcement of regulations for instance, taxes on emissions
- Have funds exclusively for addressing climate change issues in the country.
- Introduce carbon taxes for industries and large corporate bodies.
- Promote forest conservation from the grassroots level.
- Embrace community sensitization including alternative energy initiatives.
- Landscape approaches with REDD+.
- Control felling of trees including deforestation and forest degradation.

- Adoption of climate smart technologies.
- Adopt green energy.
- Focus on strengthening institutions for sustainability.
- Crop insurance especially in ASAL areas.
- Mainstream climate change into school curriculum.
- Engage industry players in pollution control
- Carbon trade
- Control of emissions

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter analyzes the findings provided in chapter four, and gives recommendations on viable policy direction for the Government to consider for implementation. The effects of climate change on human development in Kenya cannot be managed by lone organizational mandate or territorial borders. To efficiently tackle the challenges and search for likely opportunity, partnership among all pertinent institutions is required. Hence there is need to have appropriate data and create strong contacts to assure regular understanding of strengths and potential areas of cooperation, to exploit results towards the attainment of long-term and durable human development.

5.1 Summary and Research Findings

The demographics of the respondents obtained in the preceding chapter reveals the majority of respondents who are experts in Environmental sector studies do not have a lot of work experience in climate change owing to the fact, that this is a relatively new phenomenon. Climate change impacts have started to be felt in the 21st century due to their effects on human security and a keener interest has started to develop in Kenya within the last decade, with the setting up of the first Climate Change Secretariat in the Ministry of Environment and Natural Resources in 2013. Hence the majority of respondents have less than four years' experience whereas only twenty three percent of respondents have more than five years' experience.

The majority of respondents are classified as youth, which is 35 years and below, which provides opportunities for developing skills through training programs. Notably, the

gender balance reveals there are only one third of women working in this field, which is significant, bearing in mind, information provided in Chapter three depicts gender as critical in climate change mitigation and adaptation.

The Government of Kenya has prioritized six sectors to engage in addressing climate change, namely, Agriculture, Pastoralism, Forestry, Health, Tourism and Energy. However, from the data obtained, the respective Ministries have not yet allocated specific departments and officers to handle climate change within the respective sectors and hence there is not much progress and strategic plans to deal with the matters except in the Ministry of Environment and the Ministry of Energy.

Respondents agree members of the public are the most important players the government should engage in climate change mitigation and adaptation. This means that more resources need to be allocated in providing relevant education curriculums and training courses that educate the public on climate change. In addition, more resources can be utilized in publicity campaigns, awareness creation through various channels that are already in place such as Farmer Field Schools. Development partners were viewed to be the second most important players, this is because they provide expertise and funding which can be utilized to address climate change.

The majority of respondents agree that the government has put in place adequate measures to curb adverse effects of climate change. This is evidence that the programs within the priority Ministries are recognized by the public and activities being undertaken have been recognized. Most respondents view forest degradation and deforestation as the largest contributor to climate change followed by pollution. This places responsibility on the Ministry of Environment and Forestry to engage more in tree planting and to curb rampant

cutting of trees and forest degradation. In addition, because the respondents agree members of the public are the most important stakeholders to engage in climate change, their participation can be harnessed through tree planting initiatives.

Various approaches the government should use to mitigate the effects of climate change have been proposed and those that involve the public are sensitization and awareness creation, capacity building of communities, and offering incentives to the public to shift to clean energy. The approaches that are the government's responsibility include full adoption of the REDD+ process in Kenya, development and enforcement of relevant policies and laws, and high impact projects. Both government and members of the public can be engaged in increasing forest cover and reducing/ preventing pollution.

About three-quarters of the respondents agree that the recently launched National Climate Change Action Plan 2018-2022 will provide proper mitigation and adaptation measures. Hence, the Government needs to publicize the contents of the Action plan and start implementing its contents and mobilize stakeholder participation in achieving various objectives. In addition, more than half of the respondents think Kenya requires more policies and legislations on climate change. There is need to publicize the already existing policies and legislations and to source public participation in coming up with other new ones.

Respondents are of the opinion that agriculture sector is the worst affected by climate change, followed by forestry. Hence, the Government needs to prioritize mitigation and adaptation measures in Agriculture to promote food security, reduce erosion and enhance water conservation. Agro-forestry can be promoted among farmers to increase tree cover and provide fuel wood, timber, fodder, herbs and medicine and fruits and in the process tackle the

challenge of low forest cover in Kenya and reduce over-reliance on forest resources by forest adjacent communities.

Various ways were proposed by respondents to be used by the Government to involve members of the public on climate change mitigation and adaptation. These are public awareness and capacity building, traditional knowledge management, creating incentives, establishing projects to reduce greenhouse gases. About three-quarters of respondents agree the Climate Change Act 2016 will provide smooth running of issue in the country's climate change sector. Hence, the members of the public needs to be educated on the contents of the Act through mass media. Respondents proposed other methods of creating public awareness to be social media, publications and stakeholder forums. Notably, climate change forums spend a considerable amount of resources on stakeholder forums, than any other form of public awareness.

Various measures and interventions were proposed for the Government to curb effects of climate change including new forms of taxes on emissions by industries and corporate bodies. Adoption of climate smart agriculture and green energy including educating communities on alternative energy sources. Crop insurance is a new concept that could work especially in ASAL areas. Education was observed to be crucial, strengthening institutions, promoting forest conservation at the grassroots level and mainstreaming climate change in school curriculums.

5.2. Recommendations

The research findings reveal that the Government of Kenya needs to prioritize education of the public on matters of climate change by incorporating these studies in school curriculums, educating communities and various stakeholders in climate change. The most important

sectors in tackling climate change are agriculture, followed by forestry, and encouraging agro-forestry, or planting of trees on farmlands will tackle this challenge.

According to the UNDP, Kenya needs civic education on existing and anticipated effects of climate change on development, to raise awareness on challenges, thus encourage deliberate behavior change, adaptation of initiative and partaking in countrywide debate about climate resilient human development and utilizing mass media. Specific skills can also be developed through training to increase national resilience.¹⁶⁴

In addition, addressing the need for alternative fuel sources is important to reduce over reliance on biomass energy such as charcoal and fuel wood. The role of tourism, health and pastoralism in tackling climate change was not mentioned by the respondents, which implies that less priority should be given to these sectors. In addition, the role of education has been observed to be very critical, although it had not been factored earlier on in the study. Hence the Ministry of Education, needs to be engaged in incorporating education on climate change in school curriculums.

Infrastructure assets to avert potential catastrophes need to be supported with educational programmes on their utilization and maintenance, as well as incorporating disaster response and management trainings for local communities and relevant government institutions. Educational initiatives to enlighten the populace about new threats resulting from

¹⁶⁴ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. pp

climate change effects, and the need to adopt to new living styles in reaction to changes in temperature and rainfall patterns.¹⁶⁵

The research findings reveal the importance of public awareness through mass media. This is important because tackling climate change is a role that involves communities in various levels, particularly farmers. Agriculture has been observed to be the most critical in climate change, and to tackle food security, more resources need to be allocated to this sector. In addition, the role of development partners needs to focus more on creating awareness through the mass media and not stakeholder forums as has been the case. Members of the public have been viewed to the most important players in tackling climate change and more focus needs to be given to creating awareness on the importance of engaging in activities such as tree planting, environmental clean-up exercises among other activities.

The female gender puts up with most of the trouble of climate change impacts in Kenya and they are mostly susceptible in case of severe climate conditions. Hence, gender needs ought to be considered when arranging climate change response measures in all major sectors for human development.

In implementing the proposed recommendations, there is also need for an orderly approach to nationwide development scheduling for the achievement of priority goals and promotion of synergies among various sectors. Policymakers ought to embrace an incorporated technique to direct the decision- making process linking all important stakeholders for long- term and short- term objectives. However, the adequacy of policy

¹⁶⁵ Government of Kenya. *National Climate Change Response Strategy*. 2010. Ministry of Environment and Mineral Resources. p. 122.

options depends on costs and benefits for all actors involved, hence the need to broaden options to include benefits- sharing with communities. The function of public policy- makers is to create equilibrium between financial incentive and the allocation of profit across the whole Kenyan citizenry, which is the receiver and ultimate recipient of countrywide growth policies.¹⁶⁶

New ideas have been proposed which should be given due consideration by the relevant Government Ministries. These include introduction of carbon taxes to industries and corporations that pollute and providing crop insurance. Managing knowledge particularly indigenous knowledge has been identified as important, in dealing with climate change challenges such as growing drought resistant food crops.

Accomplishment of state policies and plans needs an approved allocation of duties and tasks amongst all pertinent stakeholders, counting public and private sectors, NGOs, CBOs and individuals. A well- planned mutual agenda will depend upon the organization of collaboration amid private and public tasks and incentives, with an aim to share economic, social and environmental benefits of climate change adaptation and mitigation policies across all sectors of the Kenyan society.¹⁶⁷

5.3 Conclusion

The research findings reveal education is the most vital aspect that needs to be embraced by the Government of Kenya, in order to engage members of the public in implementing climate

¹⁶⁶Government of Kenya. *National Climate Change Response Strategy. 2010.* Ministry of Environment and Mineral Resources. pp. 121 -122.

¹⁶⁷ Government of Kenya. *National Climate Change Response Strategy. 2010.* Ministry of Environment and Mineral Resources. p. 123.

change mitigation and adaptation measures, towards improving human security. This can be done by incorporating climate change studies into school's curriculum and public awareness and education. In addition, the agricultural sector needs to be prioritized to ensure food security, which is a key aspect of human development. Energy is crucial and climate smart technologies that embrace alternative forms of energy such as solar, wind, biofuels needs to be encouraged. The research reveals the Government has made notable milestones in addressing climate change through various policies and legislations, however, there is need to fast track implementation of the Climate Change Action Plan 2018-2022 by ensuring all stakeholders are engaged as soon as possible.

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PRIMARY DATA

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3. Kazuhisa Kato JICA
4. Alfred Gichu Ministry of Environment and Forestry
5. Rose Akombo Kenya Forest Service

APPENDICES

Questionnaire

Section 1: Demographics

i. Gender

- Male
- Female

ii. Age

- 25-35
- 35-45
- 45-55
- 55-65

iii. Education level

- Diploma
- Bachelor
- Masters
- PHD
- Other, name.....

iv. Affiliation

- Government
- Non- Government
- Private Sector
- Development Partners
- Other, name.....

Section 2:

1. How long have you been working in the Climate Change Sector?

- 1 year
- 2 years
- 4 years
- More than 5 years

2. Which sector of human development do you have adequate knowledge on?

- Agriculture
- Pastoralism
- Forestry
- Health
- Tourism
- Energy
- Other, name.....

3. In your view, which are the most important players the Government of Kenya should engage in climate change mitigation and adaptation from time to time?

- Non- Government Organizations
- Private Sector
- Development Partners
- Members of the public
- Other, name.....

4. Has the Government put in place adequate measures to curb the adverse effects of climate change?

Yes

No

If no explain why.....

.....

5. What human activities are contributing most to the adverse effects of climate change in Kenya?

Deforestation and forest degradation

Pollution

Overgrazing

Poor governance

Other,

name.....

6. What approaches do you propose the Government should use to mitigate the effects of Climate Change?

.....

7. In your view has the recently launched Kenya National Climate Change Action Plan (2018-2022) provided proper mitigation and adaptation measures?

Yes

No

8. Does the Country require more policies and legislations on climate change?

Yes

No

If yes which ones do you propose.....

9. In your view which sector of human development has been severely affected by the adverse effects of climate change?

- Pastoralism
- Agriculture
- Forestry (i.e. community livelihoods)
- Health
- Other, name.....

10. In what ways should the Government involve members of the public in climate change mitigation and adaptation?

.....

11. In your view does the Kenya Climate Change Act of 2016 provide for a smooth running of issues in the country`s climate change sector?

- Yes
- No

12. In your view what are the most effective communication methods the Government of Kenya should use to enlighten members of the public on the adverse effects of climate change?

- Mass Media (i.e. TV, Radio, newspapers)
- Social Media (i.e. Facebook, twitter)
- Publications (i.e. brochures, factsheets, posters)
- Stakeholder Forums
- Other, name.....

13. In your view what are some of the key measures and interventions the Government could borrow from other successful countries to curb the adverse effects of climate change?

.....
.....

EXPERT INTERVIEW QUESTIONS

GOVERNMENT

1. Kindly explain your experience in climate change matters and the pertinent issues that require to be addressed.
2. Kindly describe your view of human development in Kenya, and the impacts of climate change on human development.
3. Please outline key government interventions in addressing climate change in various sectors.
4. Explain the bilateral and multilateral partnerships and treaties and conventions to which Kenya is a party and their impact in addressing climate change.
5. Expound on the challenges in climate change mitigation and adaptation in Kenya.
6. What is the expected role of the private sector and public in addressing climate change?
7. Any other comments?

INTERNATIONAL NGO (UNEP, JICA)

1. What is the role of the international community in tackling climate change and human development in Kenya?
2. How does Kenya compare to other countries in the Eastern Africa region in particular and Africa in general, in tackling climate change?
3. What recommendations can be made to Kenya to improve its handling of climate change issues?
4. To what extent does climate change have an impact on human development in Kenya?
5. What key lessons can Kenya learn from other developing countries to address climate change?
6. What is the relevance of International treaties and conventions on climate change to which Kenya is a party to, towards enhancing human development?
7. Any other comments?

RESEARCH AUTHORIZATION



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Ref. No. **NACOSTI/P/18/61258/21024**

Date **24th January, 2018**

Anne Kaari Muthamia
National Defence College
P.O. Box 24381-00502
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*The impact of climate change in human development: A case study of Kenya*" I am pleased to inform you that you have been authorized to undertake research in **all Counties** for the period ending **24th January, 2019.**

You are advised to report to **the County Commissioners and the County Directors of Education, all Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

G.P. Kalerwa

**GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioners
All Counties.

The County Directors of Education
All Counties.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified