University of Nairobi

CLIMATE CHANGE AND HUMAN SECURITY IN THE 21ST CENTURY INTERNATIONAL SYSTEM: THE CASE OF KENYA

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DECLARATION

I, Abdikadir Sheikh Abdullahi, the undersigned, declare that this research paper is my original work that has not been presented in any institution of higher learning for academic purposes.

Signature: ..... Date: 03/12/2021

Abdikadir Sheikh Abdullahi

R50/35016/2019

Supervisor's Declaration

I have assessed the research work accordingly and do hereby approve the paper to be submitted for examination.

Signature: ..... Date: 3/12/21

Dr. Mumo Nzau

DEDICATION

I dedicate the entire research work to climate change activists

ACKNOWLEDGEMENT

In all my life I have been tremendously fortunate to be inspired by persons pillars at family, work and society level. To my pillars who have been intelligent, kind, and motivating me I want to say thank you, this far I have made it because of your support. To Allah the source of all wisdom and knowledge I offer my gratitude and thanksgiving for granting me life, strength, humility to learn and wisdom to undertake the research project.

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ABBREVIATIONS AND ACRONYMS

AU:	African Union
EU	European Union
FAO:	Food Agricultural Organization
IPCC:	Intergovernmental Panel on Climate Change
KMD:	Kenya Metrological Organization
NGO	Non-Governmental Organization
UN:	United Nations

ABSTRACT

Evidence across the world points to various impacts of anthropogenic climate change on human security at different levels. While research on security implication is documented there is still lack of consensus on climate change-human security nexus. This study critically "examined the impacts of climate change on human security in 21st century international system". This was analyzed through the following objectives: examined the "climate change-human security nexus in the 21st century international system", assessed the "impact of climate change on human security in Africa" and critically analyzed the "impact of climate change on human security in Kenya". Theory of securitization was employed in providing direction to the study. Descriptive-correlation design was utilized in data collection through primary and secondary sources. The target population consisted of climate change experts from UN, NGOs and the national government of Kenta. Descriptive statistics through the use of mean and standard deviation was used in analyzing the primary data. Findings of the study showed that at each global region is experiencing risks from climate change with risk ranging from low levels of warming to severe risks of climate change. The findings also established that extreme or more severe climate change impacts are possible if the climate change situation is not arrested. The findings revealed that climate change is connected to various human insecurities in Africa that are putting pressures on fragile food ecosystems worsening the food insecurity in Africa. The findings also showed that climate change occasioned by deforestation impacts local communities across different regions in Africa directly leading to personal insecurities, water insecurity, food security, cultural insecurity, health insecurity and environment insecurity. The study findings demonstrated that climate change impacts on human security in Kenya takes various forms such as food insecurity, health insecurity, water insecurity and personal insecurity. Further the findings revealed that the impacts of climate change on these securities are both direct and indirect. The researcher concludes that climate change scenarios positively impact on human insecurities in different areas in the world. The researcher concludes that climate change strongly contributes to various insecurities in Africa, most significant effect on food, water, health and personal security. Climate change the study concludes has led to scarcity of resources that has resulted to the exacerbation of human insecurities such as food, water, personal security and climate security has led to scarcity of resources and human insecurity in Kenya. The researcher has provided policy and practical recommendation in the research paper.

CHAPTER ONE

INTRODUCTION

Background to the Study

Environmental changes have throughout human history posed significant challenges to societies. Challenges such as floods and droughts, famines, as well as threats to biodiversity are among the key challenge's humanity is facing today the same way it has been happening for thousands of years. However, as humanity approaches the first quarter of the 21st century, these threats have significantly increased[1]. In addition to this, scholars argue that climate change will continue to have dramatic effect for the both social and natural systems.[2]

The relation that exists between climate change and the worsening social conditions can easily trigger hopelessness any place across the globe[3]. The worsening condition of climate change "is likely to be more severe in climate hotspots or in developing countries where there is limited resources that can help with coping or adaptation"[4]. Catastrophic events that are related to climate change are expected to become more worse and severe in the coming decades as temperatures and carbon emissions continues to increase. A situation that has spring into action international efforts to try and address climate change impacts. [5]

[1] Lead, Coordinating. "Climate and Environmental Change in the Mediterranean Basin–Current Situation and Risks for the Future." *Union for the Mediterranean, Plan Bleu; UNEP/MAP: Marseille, France* (2020).
[2] Paterson, Matthew. "Climate change and international political economy: between collapse and transformation." *Review of International Political Economy* (2020): 1-12.
[3] Ibid, pp 6-9
[4] Deafalla, Taisser HH, Elmar Csaplovics, Osman Elkhair, and Mustafa M. El Abbas. "The Effects of Land Cover Change on Sustainability: Human Security and Environmental Change in Semi-arid Ecosystems." In Social-Ecological Systems (SES), pp. 137-158. Springer, Cham, 2021.
[5] Newell, Peter, Matthew Paterson, and Martin Craig. "The Politics of Green Transformations: An Introduction to the Special Section." *New Political Economy* (2020): 1-4.

International co-operation on climate change has made significant progress on development of instruments for climate change adaptation. From 1992 when the UNFCCC was first signed, the treaty has been serving as a key instrument on matters to do with the global climate change rules[6]. Though the global climate governance is usually cooperative, the same cannot be said away from UNFCCC where fragmented and heterogeneous related treaties manifest themselves such as the Montreal Protocol manifest themselves in various corporate climate initiatives[7]. As it has been revealed by the near-global membership of climate change convention, then mutual and shared states agreement, it is essential that action is needed in order to mitigate against dangerous anthropogenetic interfering with the climate system.[8]

The Kyoto Protocol in 1997 which has been in force since 2005 also played a key role in facilitating international co-operation through different obligations placed to the industrialized nations who took part in ratification of the agreement except for the United States[9]. Even though the aspect of human security has not been directly referenced in either the UNFCCC or Kyoto Protocol, the most recent assessment reports, the IPCC Fifth Assessment Report (AR5) has concluded that the dangerous climate change is capable of posing a severe catastrophic threat to humanity in the future, thus, the manner in which it has been regarded as a challenge to human security is quite justifiable.[10]

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[6] Peterson, Lauri. "Domestic and international climate policies: complementarity or disparity?." *International Environmental Agreements: Politics, Law and Economics* (2021): 1-22.

[7] Ibid, pp-17-18

Groen, Lisanne. "Group Interaction in the UN Framework Convention on Climate Change." In *Group Politics in UN Multilateralism*, (2020): 267-284.

[9] Paterson, Matthew. "Climate change and international political economy: between collapse and transformation." *Review of International Political Economy* (2020): 1-12.

[10] Schleussner, Carl-Friedrich, and Claire L. Fyson. "Scenarios science needed in UNFCCC periodic review." *Nature Climate Change* 10, no. 4 (2020): 272-272.

Even against the background of global climate change, the overall effective international co-operation is yet to be fully achieved. Instead, the action of key political leaders in the recent past has also cast doubt on international efforts to address climate change[11]. The most notable global political figure who has expressed doubt on climate change efforts is former United States president Donald Trump, who termed climate change as a political joke and withdrew his country from the Paris Agreement.[12] Even though the current president of the United States Joe Biden has reversed the climate decisions brought about by his predecessor, it is still very clear that political actions at international level actually pose a major threat to global cooperation towards tacking climate change.[13]

In addition to the ongoing political pressure on the risk posed by climate change, social movements have also added to calls for climate change action. The social movements on climate change have been spearheaded by the renowned Swedish climate activist Greta Thunberg, and Extinction Rebellion[14]. Further, the international activism on climate change has also been spearheaded by multiple Climate Emergency calls at local and national government levels by spearheading the need for the achievement for the Green Deal which clearly invokes the 1930s New Deal.[15]The aforementioned efforts points to various international initiatives targeted at climate change and human security at both national and international efforts. This study will thus examine climate change and human security in Kenyan context.

[11] Engels, Anita. "Note from the editor: Climate change, capitalism, and growth." economic sociology_the european electronic newsletter 22, no. 3 (2021): 1-3.
[12] Ibid, pp 7-9
[13] Rubial, María del Pilar Bueno. "The evolution of the United States Climate Change Policies and missed leadership opportunities." *Estudios Internacionales* 53, no. 198 (2021): 9-32.
[14] Von Storch, Lilian, Lukas Ley, and Jing Sun. "New climate change activism: before and after the Covid-19 pandemic." *Social Anthropology* 29, no. 1 (2021): 205-218
[15] Ibid, pp 207-209

Problem Statement

Human beings have always sought to secure themselves and their livelihoods from natural or man-made threats. This struggle for security is becoming more and more complicated insofar that most perils are increasingly provoked by human impacts on the environment[16]. At the root of this struggles is the concern for environmental security that predisposes human security. Human security has increasingly become a challenge with impact of climate change impacting of ecosystems across the world. The catastrophic environmental, social, cultural and economic consequences have required that international and local efforts to analyze climate-security paradigm[17].

While many scholars have documented the security implications of climate change, lack of consensus still exists from experts and policy makers on how climate change and human security are related to all aspects. Further research is thus necessary to understand the linkage that exists "between climate change and human security element in different aspects in both developed and developing countries". These issues are complex and the existing literature does not deal with them adequately, therefore with the aim to contribute to the body of knowledge, this study investigates the critical relationship between climate change and human security in international system, with a focus on Kenya.

Research Questions

The study will be guided by the following research questions:

[16] Behnassi, Mohamed, and Katriona McGlade, eds. *Environmental change and human security in Africa and the Middle East*. Springer International Publishing, (2017) 1-353.
[17] D'Orazio, Paola, and Maximilian W. Dirks. *The impact of climate-related fiscal and financial policies on carbon emissions in G20 countries: A panel quantile regression approach*. No. 860. Ruhr Economic Papers, (2020): 102-135.

1. What is the connection between climate change and human security in 21st international relations theory and practice?
2. What is the impact of climate change on human security in Africa?
3. What is the impact of climate change on human security in Kenya?

1.4 Objectives of the Study

The overall objective of the study is to critically examine the impacts of climate change on human security in 21st century international system, more specifically, the study aims to:

1. To examine the Climate Change-Human Security Nexus in the 21st Century International System.
2. To assess the Impact of Climate Change on Human Security in Africa.
3. To Critically Analyze the Impact of Climate Change on Human Security in Kenya.

1.5 Rationale of the Study

Climate change is a global threat to human security and hence this study has academic and policy implications.

1.5.1 Academic Justification

Climate change has significant implication for human security across the globe. However, these impacts vary for global south and north and hence the importance to gain such an understanding in these contexts. Given that most of the existing knowledge has largely focused on global north, this study will provide insights on how securitization of climate change effects global south within the international system. The existing knowledge has also largely ignored other human security such as cultural security. Suggestions provided through the findings will help contribute to

understanding on potential climate change-cultural security relationship thus furthering more research on this area.

1.5.2 Policy Justification

Through this perspectives, international development and climate change experts will be in a better position to think holistically in development of solutions to climate security risks across the world. From the study findings, the international development and climate change experts working with relevant NGOs will be better placed to develop programmes that can effectively mitigate against human security effects of climate change. Government and local governments across the world are grappling with the climate change impacts on the wellbeing of its citizens. This calls for the need to develop sound and evidence-based policies to address these impacts. Through this study it will be possible for county and national government to develop climate smart policies leading to peace and stability across the country.

1.6 Literature Review

This section looks into studies carried out by other scholars on climate security and its impact on human security. It presents a focus discussion on the views of scholars globally, regionally and locally.

1.6.1 Climate Change-Human Security Nexus in the 21st Century International System

Climate change impacts has billions of people have the globe in the 20th and 21st century. However, real international efforts towards addressing climate only begun to take root towards the end of

20th century and the beginning of 21st century.[18] Willian traces the history of international efforts in combatting climate change impacts on human security. From his analysis stressed that 2007 was the pivotal year, not to forget the period between 1992 and 2009 that is seen as the most important period in the consolidation of international norm for climate change adaptation.[19] This point is supported in the study by Schefran. The author supports this noting that the year 2007 is important on the climate change and human security nexus for two reasons.

First, the year marked the first time that a global movement was mobilized to understand climate change. Second, the year is seen as the first time that a global movement of scholars across the world (First working group on Intergovernmental Panel on Climate Change (IPCC)) were in agreement that climate change affects species, ecosystems and human wellbeing[20]. The international efforts on addressing the impacts of climate change on security has continued todate, with the sixth assessment report produced by IPCC in August 2021. Despite the international efforts on highlighting the climate change impacts on human security, human security situation has continued to worsen globally. This section reviews the literature on the place of climate change on human security in international system.

For climate change to impact on human security at international level, global warming must continue by at least 1.5 degree Celsius. This definition is globally accepted as it is used by IPCC. In the 2018, the IPCC Special Report on Global Warming demonstrates that 1.5 degrees Celsius mark the low warming scenarios of climate variability. The report showed that the global mean

[18] Petrich, Katharine. "Climate Change, Policy and Security: State and Human Impacts, Edited by Donald Wallace and Daniel Silander. New York, NY: Routledge, 2018." *Journal of Strategic Security* 13, no. 4 (2020): 11-26.
[19] Nordhaus, William. "The climate club: how to fix a failing global effort." *Foreign Aff.* 99 (2020): 10-29.
[20] Scheffran, Jürgen, and Bundesstr ZMAW. "Climate Change, Human Security and Societal Instability: Conflict or Cooperation?" (2020) 1-12

temperature is about 1ºC/1.8°F, and is expected to soon surpass 1.5°C/2.7°F by 2030. And while these scenarios paint a global picture, much higher temperatures than these are already been experienced locally.[21]

The Center for Climate and Security report also synthesizes and summarizes the climate change and human security literature based on different levels global temperature across regions. According to the reports categorization of climate change and human security risk consist of six categories namely:[22]

"low: some material risk to human social and security systems; medium: consequential risk to human social and security systems; high: severe risk to human social and security systems; very high: severe and systemic risk to human social and security systems and catastrophic: disastrous and irreversible risk to human social and security systems".

The report highlights that climate change- human security nexus based on the risk categorization is due it "threat multiplier role". This concept addresses the potential impact of climate change on human security accelerating existing tensions, instability causing multiple chronic conditions in proportion to the risk level.[23] As the climate change increasingly interact with various systems of nature, the existing systems only become more destabilized due to their fragile nature. The

[21] de Coninck, Heleen C. "IPCC SR15: Summary for Policymakers." In *IPCC Special Report Global Warming of 1.5 ºC*. Intergovernmental Panel on Climate Change, 2018.
[22] "The World Climate and Security Report 2021, (2021): 1-92
[23] Ibid, pp 45-57

complex relationships proceeding from climate change interaction with security creates destabilizing physical shocks and aggravated social tensions in international system. [24]

A study by the center for climate and security on the likelihood of climate change scenarios on human security across the world revealed that threats to domestic and international security. In US alone the report shows that between 2014-18, climate and weather-related disasters have resulted in human security damages worth over $400 billion.[25] From their analysis they concluded that global warming in Africa is destruction and loss of livelihoods resulting to violent extremism and security threats. They further concluded that in Asia climate change will result to dwindling water supplies and intensification of resource, political and territorial competition worsening social grievances and conflict. In Europe, global average warming, is responsible for significant increases in wildfires that have seen residents' infrastructure worth over $200 billion destroyed and rise in ethnonationalist sentiments. These scenarios point out that climate change impacts regions and country differently thus highlighting the importance of understanding climate change-human security scenarios in Kenya[26].

Another report on climate change and human security by "international military council on climate and security revealed that impact of climate on human security across the world revolve on ecosystem security, water security, national security and food security". The report shows that ecosystem security in largely a problem of Asia, Europe, North America, South America and polar

[24] Prizzia, Ross. "Sensemaking and Security: How Climate Change Shapes National Security." In *Sensemaking for Security*, pp. 91-107. Springer, Cham, 2021 91-107
[25] Guy, Kate. "A Security Threat Assessment of Global Climate Change: How Likely Warming Scenarios Indicate a Catastrophic Security Future." Washington, DC. (2020): 1-86
[26] Ibid, pp 56-58

countries. National security according to the report is a global challenge of climate change because of migration problem and conflict in various ways.[27] The report also highlights that water security is a common security challenge in Africa, Middle East and Asia. In conclusion the report notes that "majority of risks will pose high to catastrophic levels of risk to security as we head to tipping point in climate change"[28]. Though this report brings out the human security risks associated with climate it fails to capture other risks linked to climate change in different regions.

The sixth IPCC assessment report demonstrates that climate change contributes to ecosystem insecurity, water insecurity, health insecurity, national insecurity, food insecurity and international security. A tipping point is according to IPCC is a threshold level which, when reached, can trigger large-scale, accelerated and irreversible changes to the planet's environmental stability. Tipping points are therefore very likely to overwhelm international security and stability unless substantial unless substantial reforms are made. [29]The above-mentioned reports and studies are largely relying on empirical studies that can are more prone to researcher biasness and manipulation.

1.6.2 Climate Change and Human Security in Africa

Climate change is a grim reality that poses a major threat to the realization of sustainable development goals in Africa. "Although Africa accounts for less than 4% of the world's total greenhouse gas (GHG) emissions, it is the most affected by climate change due to the continent's over-dependence on rain-fed agriculture, widespread poverty and weak capacity to adapt to climate

[27] The World Climate and Security Report 2021." (2021): 1-92
[28] Ibid, pp 18-23
[29] Zhongming, Zhu, Lu Linong, Zhang Wangqiang, and Liu Wei. "Interviews with authors of Working Group I contribution to Sixth Assessment Report." (2021): 1-23

change". In this regard, climate change can no longer be considered an environmental concern only but also as a human security threat to the region".[30]

Climate change has negative ramifications for the present and future generation. Campbell investigates how the rights of individual in various human securities are affected in the context of Sub-Saharan Africa. The findings showed that the climate change has impacted negatively on the rights to food, security and health in Sub-saharan Africa. These findings highlight the importance of a rights-based approach to climate change but within the focus of only three human securities excluding other securities in human rights paradigm[31].

Chikulo in a study conducted in South Africa observes that climate change compounds poverty and inequality exacerbating the conditions of the vulnerable. Climate change in South Africa significantly affects the marginalized communities who lack basic social services and are unemployed. Accordingly, the author argues that climate variability impact on the marginalized is because it undermines the resilience of such communities making it impossible for them to recover by using their own resources. Ultimately this widens inequality, insecurity and the gap between the rich and poor. [32]

A policy produced by European institute of peace identified the pathways through which climate change leads to violent conflict in horn of Africa. The policy paper found that climate change

[30] Kumssa, Asfaw, and John F. Jones. "Climate change and human security in Africa." *International Journal of Sustainable Development & World Ecology* 17, no. 6 (2010): 453-461.
[31] Ibid, pp 445-448

[32] Chikulo, Bornwell C. "An analysis of climate change, poverty and human security in South Africa." *Journal of Human Ecology* 47, no. 3 (2014): 295-303.

contributes to resource scarcity which as a result lead to conflict in any of three ways by acting as a push for people to join extremist groups like Al-Shabab due to worsening livelihood conditions, triggering in migration tensions because of increase in migration and agro-pastoralist conflicts due to push by pastoralists beyond their traditional routes. Although the scope of the paper was limited to pathways it proves useful in analyzing pathways in Horn of Africa but may not be applicable in other parts of Africa[33].

In Nigeria, Olajide analyzed the pathways of climate change on Nigerian conflicts and concluded that two main pathway exists in Nigeria. The worsening of livelihood conditions because of climate change and tensions over limited scarce water stress emerged from the study as the pathways. The study concludes that pathways to climate change differs for various human insecurities and therefore suggests empirical work to investigate for pathways to different human insecurities linked to climate change.[34]

The empirical work of Deafalla in Sudan, also attempted to account for the links between climate change and human security, and concluded that human security implication are severe where resources are scarce, property rights unclears and poverty is more widespread. Further the author noted that some of the forces behind armed conflict are inherent in climate change and natural resource conflict. Additionally, the study reported that changes in social and livelihood structure in Sudan is largely because of climate change.[35]

[33] European Institute of Peace. "Making Peace with The Climate Conflict resolution in a climate-changing world"(2020): 1-24

[34] Olajide, Bamidele Emmanuel, Maryam Omolara Quadri, and Victor Ojakorotu. "Climate change, human security and good governance in Nigeria." *African Renaissance* 15, no. 3 (2018): 173-196.

[35] Deafalla, Taisser HH, Elmar Csaplovics, and Mustafa M. El-Abbas. "Environmental Change Impacts and Human Security in Semi-Arid Region, the Case of Nuba Mountains of Sudan." In *Human and Environmental Security in the Era of Global Risks*, pp. 187-203. Springer, Cham, (2019):56-69.

The negative effects of climate variability have also been felt on food security situation in East Africa. For instance, the study by Akiyode conducted in Uganda reports that climate change is already exposing people to more vulnerabilities. In Akiyode, food accessibility and availability challenges in the region are thought to be linked to climate change effects on agriculture. Climate change also affects water security in East Africa[36]. A case in point is reported in the study carried out by Said in Tanzania. Climate change was established to result in water catchments downstream around Mt Kilimanjaro been affected, thereby affecting food productivity, agriculture production and contributing to water-resource conflicts in areas around Mt Kilimanjaro[37]. At present, most of the empirical work have largely been limited to water security, agriculture and food insecurity and personal conflict. Little is known about climate change and other aspects of human security not covered to which this study will help address the gap.

1.6.3 Climate and Human Security in Kenya

The connection between environmental concerns and human security has been amplified in media and academic works in recent times. Much of the work has dwelt on the climate change impacts on developing world where significant population are vulnerable to human insecurities. [38]. Kenya like other countries in the Horn of Africa region faces socioeconomic and political challenges,

[36] Akiyode, Oluwole O., Anne Tumushabe, Katongole Hadijjah, and Onu Peter. "Climate change, Food security and Environmental security: A conflict inclination assessment of Karamoja region of Uganda." *International Journal of Scientific World* 5 (2017): 72-90.
[37] Said, Mateso, Hans Charles Komakech, Linus Kasian Munishi, and Alfred Nzibavuga Nyarubakula Muzuka. "Evidence of climate change impacts on water, food and energy resources around Kilimanjaro, Tanzania." *Regional Environmental Change* 19, no. 8 (2019): 2521-2534.
[38] Sheriff, S. S., and J. Koske. "Low Environmental Education: The Cause to High Socioeconomic Impacts of Climate Change Induced Flooding in Mombasa, Kenya." *Environ Pollut Climate Change* 5, no. 208 (2021): 22-36.

which include “endemic poverty, weak governance structures, protracted conflicts, demographic pressures and rapid urbanization”.[39]

M’mboroki studied the impact of climate change on personal conflict in Kenya. The results of showed that climate change has implication on resource-based conflicts in the country. Climate change the study revealed is a stress factor in aggravating already existing tension over natural resources. Resource based tensions as an aspect of personal conflict is clearly demonstrated in the study but this raised question on the possibilities of other aspects of personal conflicts in Kenya.[40]

The role of natural resources as a stress factor for conflict due to climate change is also emphasized by Mariara study in Laikipia county. Through historical analysis of the frequency of clashes between pastoralists and farmers in the county, the findings revealed that agro-pastoralist clashes have increased in recent years. The study suggests that increases in clashes over traditional herding grounds in Laikipia county is due to ravaging effects of drought linked to climate change[41]. Climate change hazards not only include droughts but also floods, heat waves and wind hazards. This demonstrates the need to understand how other hazards have impacted on human security in Kenya.

[39] Ibid, pp 28-29
[40] M’mboroki, Kiambi Gilbert, Shem Wandiga, and Silas Odongo Oriaso. "Climate change impacts detection in dry forested ecosystem as indicated by vegetation cover change in—Laikipia, of Kenya." *Environmental monitoring and assessment* 190, no. 4 (2018): 1-19.
[41] Kabubo-Mariara, Jane, and Millicent Kabara. Climate change and food security in Kenya. Routledge, (2018): 55-80

Kenya according to various scholars like Shazia has been a case in point on climate change-human security nexus in recent years[42]. Shazia established in his study conducted on Mau Forest Cover that climate change has led to significant scarcity of environmental resources that has affected water security and agriculture in Kenya. The dwindling of the Mau Forest Cover has affected water supply to trans-boundary water bodies, depleted underground water sources and led to loss of livelihood due to frequent floods caused by Mara River in Narok county. The implication of climate change on Mau Forest is not without doubt from the study although this fails to show how widespread the impacts are in Kenya[43].

To examine more closely the impact of environmental factors on human security, Kinoti conducted a study in Mount Kenya Region. The author showed that environment degradation is tied to worsening of human insecurity in the region, through speeding up aging process and by increasing the likelihood of individuals exposures to different diseases and increases food insecurity through water scarcity[44]. The findings further revealed that reduction in glaciers on Mt Kenya and its consequences on reduced water flow in the region has its source in climate change. The consequence of which has been a reduced recharge to the rivers that originate from the mountain, which as result has affected livestock and crop yields in the region. Climate change implication are not limited to mountain regions only but widespread across the country as this study reveals.[45]

[42] Chaudhry, Shazia. "Climate change and human security in Africa:: a case study of the Mau forest complex, 1963–2012." PhD diss., University of Nairobi, 2014: 1-256
[43] Ibid, pp 101-108
[44]Kinoti, Kibetu Dickson, Colbert Mutiso Jackson, and Mwangi Joyce Muthoni. "Dynamics of Climate Change Adaptations on Horticultural Land Use Practices around Mt. Kenya East Region." *Am. J. Environ. Prot* 7 (2018): 1-6.
[45] Ibid, pp 4

The implication of climate change on people's security and survival has also been highlighted in Kenya. A more recent example on this is the study by Makanga that showed that due to the increased in climate related hazards in ASAL areas have contributed to increased food insecurity and water insecurity. This case illustrates why "agro-pastoral communities are increasingly vulnerable to climate related hazards because of their dependence on the traditional free range grazing system"[46].

Another study was conducted on climate change and Human Security in Kenya, with a bias towards Mau Forest Complex. The study documented those climatic changes have notably led to resource scarcities with fundamental effects on various aspects of human security in the Mau Forest Complex, more specifically food insecurity, rural-urban migration, conflicts, water scarcity and healthcare challenges[47].

A much more recent study aimed to analyze the impact of climate-security risks in Turkana. The findings of the study demonstrated climate induced variability in Turkana has led to a scarcity of food, water, and pasture. As a consequence, resource-based conflicts have increased in the county.[48]. Although climate change-human security connection in Kenya is well documented, much of the prevailing understanding to date has been limited to various forms of human security except cultural security. Thus, this study will in particular explore how climate change affect human security, specifically cultural security.

[46] Makanga, Cindy M. "The Impact of Environmental Factors on Human Security in Africa." PhD diss., University of Nairobi, (2019): 1-123.
[47] Chaudhry, Shazia. "The Impact of Climate Change on Human Security: The case of the Mau Forest Complex." (2015): 390-398.
[48] Heiret, Tiril. "The Impact of Climate Change Induced Resource Scarcity on Human Security: An Analysis of Experiences by Families in Lokichoggio, Turkana County, Kenya." PhD diss., United States International University-Africa, 2020: 1-220

1.6.4 Gaps

The extant literature revealed that there still exists a lacuna that is yet to be addressed in existing studies. Notably, there is an inclination for most of the existing studies to focus on limited aspects of human security. Though human security is a multi-dimensional concept, failure to look at human security comprehensively may limit the understanding on climate change implications in various region or contexts.

Additionally, country-based studies that are based on empirical studies are scant with existing studies focusing on the use of secondary data only, mostly reports. The review of literature also suggested that climate change implications on human security occurs through different pathways that are context specific. Thus, it is necessary that more studies be conducted to explore pathways specific to different aspects of human security. This study is geared at addressing these emergent gaps.

1.7 Theoretical Framework

The study will make use of securitization theory to critically analysis the human security-climate change nexus in the study.

Theory of securitization

The rise of Cold war led to conventional change in nature of security threat in international relations, with shift from military attack from another country to threats to country ideologies values and development. This description of security is the central pillar in the prevailing theories in international relations: liberalism and realism. However, this description is narrow because it

only examines security in the military aspects. Since the end of the Cold War, non-military threats like environmental degradation become critical security issues[49]. Resultantly, critics of the conventional perspective proposed that the concept of security should be extended beyond the military aspect to capture other issues such as social, economic and environmental threats. Because of this significant rethinking of security, the securitization theory was developed. This approach, which is also called the *Copenhagen School* (CS) was developed and propagated by Ole Wæver, Barry Buzan and Jaap de Wilde[50].

Unlike the traditional perspectives, the securitization theory combines the narrow security notions with two critical implications. First, it extends the term 'security' towards non-military threats such as economic and environmental issues. Second, the approach deepens the security concept beyond the nation-state referent object. Based on this approach, a security concern is a social construct and the outcome of a speech act[51].

Securitization theory is composed of a "referenced object, securitizing actor and functional actor". A referent object refers to someone or something that is regarded to be under an existential threat and that has a genuine claim to survive and can include identity, humankind or state. An existential threat refers to a threat that is so pressing to the extent that if it is not addressed immediately, it will result in catastrophic outcomes and all other issues will become irrelevant. A securitizing actor refers to player that declares a particular referent object to be existentially threated (for instance,

[49] Jägerskog, Anders. "New Threats? Risk and Securitization Theory on Climate Change and Water." In *Coping with Global Environmental Change, Disasters and Security*, (2011): 757-764.
[50] Warner, Jeroen, and Ingrid Boas. "Securitisation of climate change: the risk of exaggeration." *Ambiente & Sociedade* 20, no. 3 (2017): 203-224.
[51]Isacson, Linn. "Climate Change, Securitization and Greta Thunberg." (2020): 1-14

international political leaders, pressure groups and governments). Finally, a functional actor refers to an actor that retains the capability to influence policy and decisions in a particular security sector (such as the arms sector in the military industry[52].

The securitization framework is "essential tool for understanding how climate change impacts on human security". This is because the theory argues that action of actors such as human activities exposes people to vulnerability and risks of climate change that impacts on human wellbeing. This theory will thus provide invaluable tools for the analyzing the "link between climate change and human security in international theory and practice".

1.8 Hypotheses

(1) Climate change has led to human insecurity in the 21st century international system

(2) Climate change is a key driver of human insecurity in Africa.

(3) Climate change has led to human insecurity in Kenya

[52] ibid

1.9 Conceptual Framework

Figure 1: Conceptualization of Human Security Impacts of Climate Change

Source: "Climate Change and Human Security Implication": Climate Change and Security: Different Perceptions, Different Approaches, (2017): pg 11

1.10 Research Methodology

1.10.1 Research Design

This study adopts a descriptive correlation design. Descriptive study design is concerned with explaining the properties of the variable under study in detail. This is helpful in describing the variables of climate change and human security in great detail. However, descriptive design on its own has its shortcomings in establishing the relationships between variables. It is for this reason that correlation design, a subset of descriptive design is employed to help in explaining the impact of "climate change on human security in Kenya".

1.10.2 Target Population

These were the member of civil societies engaged in climate change adaptation, members from UNEP and senior government employees from ministry of environment and forest. The total target population to be employed in the study was 306 respondents as explained in the table below

Table 1.1: Target population

Category	No of Respondents
Members from Civil Society involved in climate change adaptation	256
Members from UNEP office in Nairobi	34
Senior members from ministry of environment and forest	16
Total	306

1.10.3 Sample Size and Design

The sample size refers to the subset of population of interest from which data will be collected through a scientific methodology. Given that the sample size is assumed as having the characteristics of target population, the researcher will settle on 10% of the study population to be the sample size. To ensure representativeness of the various clusters, the researcher targeted 10% from each cluster and hence the sample size of the study was 31 respondents as explained in the table below. This study made use of "non-probability sampling, with purposive sampling technique to be used in selecting respondents who are knowledgeable on subject matter. or the study". Preference to this technique is based on its ability to collect data from reliable sources. It was also be used in selecting material for secondary sources. Purposive sampling were complimented by snow-balling technique, to be used in identification of material from known sources in desktop review through forward and back reference technique.

Table 1.2: Sample Size and Design

Category of Respondents	Sample size from each category
Members from Civil Society involved in climate change adaptation	26
Members from UNEP office in Nairobi	4
Senior members from ministry of environment and forest	2

1.10.4 Methods of Data Collection

The study relied on both primary and secondary sources. The study primary data was derived semi-structured, unstructured interviews and content reviews. Content analysis were also used to collect data from secondary data sources, and this entailed the use of IPCC reports, academia, and journals. Data will also be compiled from published materials from UNEP reports and state department reports from ministry of environment and forestry.

1.10.5 Reliability and Validity of Data Collection Instruments

To ensure reliability and validity of data collection instruments the researcher adopted questions from scholars who have conducted studies on climate change and human security in international relations, and have tested the reliability and validity of research questions. The researcher also utilized the knowledge of the researcher supervisor and known scholars from international relations on climate change, to develop sound questions.

1.10.6 Data Analysis

Qualitative data analysis through the use of content and thematic data analysis was used to analyze interview data collected. In testing the hypothesis, the researcher used the thematic data presented

based on the study objectives. This was followed by the review of data based on questions and tabulation of evidence relating to study's initial objectives, research questions and hypothesis. Comparison was made with data from secondary sources to allow for presentation of comprehensive study findings.

1.10.7 Legal and Ethical Considerations

The researchers only collected data from respondents who provided informed consent based on their understanding of the benefits of the study, any foreseeable risks and the purpose of the study. Data collected were treated with confidentiality and utmost privacy, with data destroyed 3 months after the completion of the study. Besides, the findings were only utilized for academic purposes.

1.11 Study Layout

This study begins to unfold with a discussion on climate change and human security by introducing these variables and by highlighting the problem within the context of international system. Chapter two explores the climate-human security nexus in 21st century international relations and practice, with a focus on global south and north cases of Australia and Brazil. Chapter Three explains the "climate change-human security connection within the various region of Africa". Chapter four critically analyzes climate change-human connection in Kenya. Chapter five "provides a summary of findings, conclusion to be made on climate change-human security connection and recommendation thereof".

CHAPTER TWO: AN ASSESMENT OF CLIMATE CHANGE-HUMAN SECURITY NEXUS IN THE 21ST CENTURY INTERNATIONAL SYSTEM.

2.0 Introduction

This chapter presents a discussion, interpretation and analysis of research findings on climate change-human security connection in international system. Data was collected and analyzed from secondary online sources.

2.1 Climate Change Scenarios and Human Security in the International System

Scientists across the world are observing changes in the Earth's, "according to the latest Intergovernmental Panel on Climate Change (IPCC) report".[53] The unprecedented changes in climate in thousand and hundreds of years has set in motion significant effect such as continued sea level rise that is deemed as irreversible. The report estimates that the current global warming level across the world ranges from 1°C to 1.5°C, with the global warming in the next decades expected to average 1.5°C to 2°C which is deemed as catastrophic. The report shows that since 1900 global warming of approximately 1.1°C is linked to green- house emissions from human related activities. Every region according to the repot is facing increasing changes depending on the level of warming.[54]

The rise in "global temperatures from 1°C to 1.5°C" are driving extreme weather globally, with increasing impacts on societies and economies. The average rise in global temperatures is amongst the highest over the past five years, with the ensuing heating causing a loss of billions of work

[53] IPCC Press Release. "Climate change widespread, rapid, and intensifying" 2021: 1-6
[54] Ibid, pp 5

hours worldwide. Heat can affect human health directly or indirectly. The direct impacts include "increased morbidity and mortality due to heat stress, heatstroke and exacerbations of cardiovascular, respiratory and cerebrovascular diseases". The global heat-related mortality attributed from rising temperatures is estimated to have increased by 53.7% between 2000-2018 resulting to approximately 300,000 deaths across the world.[55]

The indirect impact of heat on health concerns air quality and critical infrastructure. The direct and indirect effects of global warming is felt more on vulnerable populations such as the elderly above age 65, infants and children's, persons with preexisting medicating conditions, people from low socio-economic status and persons with psycho-social disabilities.[56] The likelihood and incidences of wildfires have increased from the rise in global temperatures and heatwaves exacerbating global warming by increasing CO2 emissions. Wildfire smoke is more likely to have compromised the global air quality since it contains a complex mixture of particles. As a result, incidences of lung irritation and inflammation across the world have increased affecting the immune system and increase the risk of lung infections.[57] Wild fires have led to severe loss of livelihoods, destruction and damages to property and a severe loss or displacement of many millions of animals.[58]

Climate change is linked with "changes in frequency and intensity of severe weather events worldwide". Natural disasters like heat waves, storms, flooding, wildfire and droughts, which can upset local communities' destruction of livelihoods and sudden instances of mass death are more

[55] https://reliefweb.int/report/world/framing-climate-change-need-human-security-perspective, pp 1-9
[56] Ibid, pp 6
[57] Morrissey, John. "Mobilising the Language of Emergency: Human Security and Climate Action Discourse." Irish Studies in International Affairs 31 (2020): 59-70.
[58] Ibid, pp 61-62

likely linked to warming temperatures created in atmosphere. These natural disasters are projected to rise in the coming decades with variability in climate in all regions. Increasing heat waves, longer warm seasons and shorter cold seasons projected for 1.5°C of global warming while extreme heat extremes, severe droughts, wild fires and worse floods are projected at 2°C.[59]

Multiple changes are connected to climate change in the international system, with these changes expected to increase with further warming. Climate change has intensified the water precipitation leading to floods in some areas and drought in other areas. In high latitudes, rainfall patterns are likely to increase while in areas of low altitudes, droughts are more likely to persist. Coastal areas are also expected to witness rise in sea level rise throughout the 21st century, further worsening coastal flooding.[60] The significant rise in rainfall precipitation in some areas has resulted in flash floods in those areas while drought has worsened in other areas. The World Metrological Organization 2020 report states that worsening cases of floods and drought globally has led to major and diverse impacts on population movements and on the vulnerability of people on the move throughout 2020. [61]

According to IPCC report scenarios, even when emissions are completely minimized, a warming of 1.5^0c in the next two decades is "more likely than not" before bouncing back. Based on the report, extreme heat has become more “intense and frequent in most parts of the globe since 1950”. The IPCC report further asserts that human activities are the main drivers of climate change.[62]

[59] Ibid, pp 64
[60] Guy, Kate. “A Security Threat Assessment of Global Climate Change: How Likely Warming Scenarios Indicate a Catastrophic Security Future.” Washington, DC. (2020): 1-86
[61] Sturm, T., & Lustig, N. F. (2021). Variegated environmental apocalypses: Post-politics, the contestatory, and an eco-precariat manifesto for a radical apocalyptics. In Imagining Apocalyptic Politics in the Anthropocene (pp. 213-234). Routledge.
[62] IPCC Press Release. “Climate change widespread, rapid, and intensifying” 2021: 1-6

Climate change is seen as leading security threat across the globe. Its effects affect countries, communities and individuals globally. For instance, the phenomenon causes poverty, disease and hunger as well as threatens political and social stability. Besides intensifying existing political and social tensions, climate change also creates new ones. Failure to address this wicked problem implies that existing tensions will be aggravated while new ones will be triggered worldwide. Resultantly, climate change has been identified as an international security issues by the UN Security Council.[63]

The global climate is experiencing significant changes including the ongoing rise in temperature. These changes are becoming more conspicuous in two areas: hard security and human security. The UN reports points out that the human security aspect is more obvious in the water, food and energy security nexus. The hunger risk issue is relatively high and is expected to rise by 10 to 20% by 2050. The main outcome of climate change in the context of the risk is reduced agricultural productivity.[64]

Likewise, climate change is drastically affecting the supply of fresh as well as safe drinking water. Over two billion people are currently living in countries experiencing high levels of water stress. This situation is projected to exacerbate as climate change continues to threaten water sources. Another vulnerable sector is human health, particularly in terms rising deaths because of water and

[63] Abdenur, Adriana Erthal. "Climate and security: UN agenda-setting and the 'Global South'." Third World Quarterly (2021): 1-12.
[64] Sybikowska, Bogdana. "Climate change: a challenge to international security." *Травневі студії: історія, політологія, міжнародні відносини* (2021): 37-38.

vector-borne diseases. Climate change also threaten the quest for development. According to UN estimates, "more than 100 million people are likely to pushed to extreme poverty by 2030". [65]

2.2 Climate Change Scenarios and Human Security in Different Regions

The IPCC's report Panel on Climate Change points out that the world has swiftly warmed 1.1^0C higher than pre-industrial levels, and is now moving toward 1.5 degrees, a dangerous threshold that global leaders agreed that warming should remain below to avoid worsening effects.[66] The effects produced by global warming can be measured through physical indicators like increased ocean temperatures, rising sea levels, , decreased ice and snow surface coverage (both terrestrial and marine), rising incidence of heat and intense rains. [67]

According to the IPCC report, global warming is causing increased, and in some cases irreversible, changes to rainfall patterns and extreme weather events in Europe where it has been warned that a 2°C increase in temperature will have critical effects for nature and people.[68] For instance, in Europe climate change characteristics exhibit a more extensive nature on the increase of summer temperature, hot days and heat waves[69]. European countries have faced one of its worst heat waves in decades, devastating wildfires in different countries in northern and western Europe claiming the lives of not less than 200 individuals.[70] The emergence of floods in Germany, Belgium and the

[65] Ibid, pp 39
[66] IPCC, 2021: Summary report. Cambridge University Press. In Press
[67] Sanford, Mary, James Painter, Taha Yasseri, and Jamie Lorimer. "Controversy around climate change reports: a case study of Twitter responses to the 2019 IPCC report on land." *Climatic change* 167, no. 3 (2021): 1-25.
[68] Ibid, pp 6-7
[69] Teixeira, Nuno Severiano, Joana Castro Pereira, and Susana Ferreira. "Human security, climate change, and migration: A European perspective." In *Towards a New Multilateralism*, pp. 132-150. Routledge, 2021
[70] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield,

Netherlands, as well as the heat wave and wildfires across in Europe have led to untold suffering in affected areas through loss of property and lives and destruction of property. [71]

Naumann estimates the "annual economic drought losses in the European Union and United Kingdom at €9 billion per year although European Environmnet Agency estimates on economic drought losses are much higher".[72] This corresponds to "approximately 0.08 of European Union and United Kingdom combined gross domestic product (GDP)".[73] Naumann argues that despite real difficulties in monetizing drought losses and the uncertainty surrounding the current estimates, Spain, Italy and France have highest drought losses. On the contrary drought losses relative to the size of the economy are highest in Romania and Bulgaria while lowest in Finland, Sweden and the United Kingdom.[74]

"Droughts affect ecosystems and societies in many different ways because water is essential to life and important for many of our activities". "Droughts induce a complex web of impacts that span many sectors of the economy, including farming and livestock, public water supply, energy, tourism, human health, transportation, biodiversity and ecosystem services. Sectoral impacts of drought losses in Europe relate largely to impacts to agriculture (crop and livestock), energy production, water supply, river navigation, and damage to buildings due to soil subsidence".[75]

O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press pp 1-356

[71] Ibid, pp 67-70

[72] Davies, Anna R., Vanesa Castán Broto, and Stephan Hügel. "Is there a new climate politics?." Politics and Governance 9, no. 2 (2021): 1-7.

[73] Ibid, pp 6

[74] Lazard, Olivia, and Richard Youngs. "The EU and climate security: toward ecological diplomacy." *Carnegie Europe* 12 (2021), pp 1-19

[75] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield,

A sectoral disaggregation of estimated human security losses linked to droughts shows more than half of total drought losses in Europe are accounted by agriculture, with the greater share of the losses coming from the Mediterranean region while the lowest share of the losses come from boreal region. Energy sector losses accounts for 23% of the total damage, but with boreal region representing nearly half of the total energy impacts given that hydropower is an essential energy source in the region. Losses in the public water supply due to droughts in Europe ranges between 10-21%.[76]

According to IPCC 2020 report, 1.5-2 degrees warming is more likely to result to around 10 percent of Europe's population competing over inadequate water supplies. In Southern Europe, the situation is likely to worsen with more than a third of the population likely to face worsening water insecurity thereby impacting on food availability in the region.[77] With worsening climate change in Europe is expected that yields of major staples food like wheat in Southern Europe will dwindle by between 10-12 percent while growing by 5 percent in the north. In addition, the worsening of global will increasingly render it impossible for traditional staples foods to grow in central and western Europe without irrigation.[78]

The harsh reality of climate change in Asia has been felt through toxic smog, flooding and landslides, cyclones, droughts and deadly heatwaves.[79] The military council on climate change and security notes that floods occasioned by monsoon rains in India has led to displacement of

O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press pp 1-356
[76] Ibid, pp 101-107
[77] Ibid, pp 108-109
[78] Knez, Sandi, Snežana Štrbac, and Iztok Podbregar. "Climate Change in the Western Balkans and Eu Green Deal–Coherence, Challenges, and Perspective." (2021), pp 1-14
[79] Ibid, pp 6-9

thousands in the country.[80] Storms and cyclones have continued to affect most countries in Asia such as China and Japan, with the rise of urbanization blamed on this. [81]

Details of global warming occurs in China has also been highlighted in the IPCC report. The report offers a synthesis of climate change hazards in China as a result of global warming. The report presents a "grim future of the increases in temperatures climb 2°C above the current rise of 1°C, heavy precipitation will become more intense and frequent; drought will become more severe and regular in large parts of China; tropical cyclones will increase in intensity; and temperatures could surpass 41°C on 30 days of the year".[82] Climate change continue to be catastrophic for humanity in Asia, with water systems and security one of the key insecurities affected in the region. As a result, agriculture production and food security has greatly suffered in the region. [83]

"Climate change is altering rainfall patterns in Asia, both in terms of the amount of rainfall and its timing resulting to shift in seasonal water availability and increase floods. The total number of flood events in Asia increased fivefold from 1980s to 2020". "These rise in floods have further contributed to the endangering of human lives, damage to homes and public infrastructure, destruction to crops and harm to the economy".[84]

[80] "The World Climate and Security Report 2021." (2021): 1-92
[81] Ibid, pp 84-85
[82] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press, pp 1-356
[83] Ibid, pp 54-56
[84] Salam, Irene. "Human Security—Climate Change—Manipur: The Gate Way to South East Asia." *Journal of US-China Public Administration* 14, no. 5 (2017): 293-300.

Heavier rainstorms in Asia have further worsened surface runoff, that has resulted to increased water population leading to detrimental human health.[85] The receding of glaciers in the region has affected the surface run-off to rivers and streams. As a consequence, water availability for domestic consumption and agriculture use has become a challenge. [86] Approximately six countries in Asia are at risk of loosing their land to floods and sea level rise in the region. Sea level rise in the region has contributed to loss, destruction of livelihoods and reduction in winter tourism in the region.[87] The worsening of droughts in Asia has led to water scarcity resulting to increased water demand from the limited water sources. As the demand for water increases, inter-communal and intra-communal conflicts have intensified in the region with more groundwater depletion and shrinking glaciers.[88]

The years 2019 and 2020 have also marked the warmest years in USA and Canada in recent times, with, "1.0°C above the long-term average of 1980-2010 climatological reference period". The reported USA and Canada peak of 54°C and 49.6 °C respectively is the highest ever temperature reported in the region's history. In 2020, the record-breaking heatwave was also experienced across most states in USA and Canada and 329 wildfires were recorded in the Canada and USA only shuttering the wildfire record of 220 in 2019.[89]

[85] Ibid, pp 295
[86] Salam, Irene. "Human Security—Climate Change—Manipur: The Gate Way to South East Asia." *Journal of US-China Public Administration* 14, no. 5 (2017): 293-300.
[87] Abdulghani, Roeslan, African Union AU, Agent Orange, Muthiah Alagappa, Mohammed Ali, Kofi Annan, Arab League et al. "Argentina, 61 Asia human security, 145 regionalism, 180–2 response to R2P, 122–133."
[88] Ibid, pp 125
[89] Ibid, pp 128

The year 2020 was one of the warmest years in Latin America and the Caribbean (LAC), with record breaking temperature and heat waves in the region.[90] Climate change also threatens human security in the environment in Latin America and the Caribbean (LAC). Climate change hazards in the region has mostly taken the form of increasing temperatures, droughts, changing precipitation patterns and receding glaciers. Notable impacts of the climatic events as highlighted in a climate risk report in LAC relates, to food loses, water and energy-related shortages and displacement.[91] Between 1998 and 2020, over 312,000 lives were lost and more than 277 million people directly caused by climate-related and geophysical events. Climate change is impacting livelihoods in the LAC region and increasing disaster risk. The LAC region also experienced widespread drought with significant impacts, including reduced crop yields, food production and deteriorating food security.[92]

In the Amazon basin, an estimated 5.5% of the region's forest cover was loss in the period 2000-2016, impacting on ecosystems and livelihoods of indigenous communities. The Amazon River basin, which "stores 10% of global carbon has experienced heightened deforestation in the past decade due to clearance for cattle pasture, large scale farming and degradation from fires". As a result, irreversible damages to ecosystems and livelihoods dependent on them were affected. [93] The rise in conflicts over Amazon Forest resources has been witnessed due to increased encroachment by people into the forest, the natural habitat of indigenous communities in Brazil. "Extreme weather events affected over 8 million people across Central America, exacerbating food

[90] World Metrological Organization. State of the Climate in Latin America and the Caribbean (2020) : 1-35
[91] Garcia-Mogollón,"Effects of climate change and its impact on some variables that influence the quality of life of populations in Latin America., no. S1 (2020): 340-358.
[92] Azócar, Gabriela. "Climate change perception, vulnerability, and readiness: inter-country variability and emerging patterns in Latin America." Journal of Environmental Studies and Sciences 11, no. 1 (2021): 23-36.
[93] Ibid, pp 28

insecurity in countries already crippled by economic shocks, COVID-19 restrictions, and conflict" [94]

The report by EPA shows that with increasing climate change life is becoming harder for citizens in Latin America Countries. For instance, the report mentions "Lyme disease, which is growing more prevalent in some states as a warming climate expands the regions where deer ticks can survive, to the growing drought in the Southwest that threatens the availability of drinking water, increases the likelihood of wildfires but also reduces the ability to generate electricity from hydropower".[95] In Europe climate change impacts has been linked to wildfires that caused the destruction of property, loss of lives and livelihoods. Deadly floods also swept through the streets of western Europe resulting to the loss of lives for over 300 persons, destruction of property and loss of livelihood.[96]

The effects of climate change in America are not standard across all regions, with north west regions experiencing significant effects than other regions in America. The North West region have witnessed worse droughts that have exacerbated water scarcity in the region.[97] Water has long been a source of contention and tension in the Basin in north west, with farmers and fishermen increasingly fighting over the scarce resources in the region. Hence maintaining the balance

[94] Ibid, pp 388
[95] EPA. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment. U.S. Environmental Protection Agency, EPA 430-R-17-001 (2017): 1-277
[96] Christidis, Nikolaos, and Peter A. Stott. "The influence of anthropogenic climate change on wet and dry summers in Europe." Science Bulletin 66, no. 8 (2021): 813-823.
[97] Shamir, Eylon, Elia M. Tapia-Villaseñor, Mary-Belle Cruz-Ayala, and Sharon B. Megdal. "A Review of Climate Change Impacts on the USA-Mexico Transboundary Santa Cruz River Basin." *Water* 13, no. 10 (2021): pp 13-90.

between this competing interest has increasingly becomes a challenge in the climate change era in America. [98]

"Arab countries are among the most vulnerable to climate change, according to a series of reports developed by the Arab Forum for Environment and Development (AFED)".[99] "The ramifications of climate change is already felt across Middle East with urban areas suffering from more frequent dust storms, while farming communities struggle to cope with irrigation water shortages and rising soil salinity".[100] A report by AFED detailed how the water crisis of 2009 in in the Middle East destabilized the region, sparking civil wars in Syria and Yemen."

Water shortage is seen as one of the biggest threats to social stability in Middle East following its role on water-related tension that continued between various groups in Yemen resulting to civil war. [101] Climate change is spelling a doom for most of the pastoralist tribes in the middle east region that depend on the scarceexistential crisis for some of the pastoralist tribes in Iraq. The wells that once sustained livestock have long run dry. "Water availability is a serious issue in the Arab world as 18 out of the 22 Arab countries are facing severe water shortages"[102] According to the AFED report, the region is likely to face exacerbating water crisis in the region.[103]

[98] Ibid, pp 45
[99] AFED. Report of the Arab Forum for Environment and Development: ARAB ENVIRONMENT IN 10 YEARS (2017): 1-208
[100] Ibid, pp 126
[101] Ibid,
[102] Ajjur, Salah Basem, and Sami G. Al-Ghamdi. "Evapotranspiration and water availability response to climate change in the Middle East and North Africa." Climatic Change 166, no. 3 (2021): 1-18.
[103] AFED. Report of the Arab Forum for Environment and Development: ARAB ENVIRONMENT IN 10 YEARS (2017): 1-208

2.3 Conclusion

From the above analysis, it can be seen that climate change scenarios affect human security in various ways in the international system. The rise in global temperatures from 1°C to 1.5°C are fueling devastating extreme weather throughout the world, with spiraling impacts on human securities across the world. Climate change impacts directly on water security and food security in the international system by aggravating water scarcity for domestic use and rain-fed agriculture. This chapter also reveals that the impact of climate change on human security is also felt on health security, directly and indirectly. The average rise in global temperatures has directly resulted to increase morbidity and mortality due to heatstroke, heat stress and exacerbations of cardiovascular, respiratory and cerebrovascular diseases. The indirect impact of climate change on health largely concerns deteriorating air quality across the world. The rise in climate hazards in the world serves to push the vulnerable population to new areas through migration leading to increased tensions and conflicts between communities over scarce resources.

Climate Change Scenarios in different regions impacts variedly in those areas. In Europe, the chapter reveals that rise in climate variability has led to exacerbation of health insecurities through heat waves, increase in food insecurity occasioned by dwindling yield of major staple foods in Southern and Eastern Europe and loss of property and livelihoods through destructions occasioned by floods. In Asia, water and food systems have been affected by climate variability. In Latin and South America, the notable impacts of climate change highlighted in this chapter include conflict over use of deforestation in Amazon Forest, shortages in water and energy, displacement and loss in agricultural land and health insecurities.

CHAPTER THREE: AN ASSESSESMENT OF THE IMPACT OF CLIMATE CHANGE ON HUMAN SECURITY IN AFRICA

3.0 The Introduction

This chapter among other things focused on the connection between climate change and human security in Africa. The chapter proceeded to climate change scenarios in Africa and how different scenarios affect human security.

3.1 Climate Change Scenarios in Africa

In the latest report from the Intergovernmental Panel on Climate Change, scientists are unequivocal that climate change is bad, and that human greenhouse gas emissions are to blame. For Africa, scientists who documented the report state with high degree of confidence that the continent is already warming faster than the global average, and is witnessing an increase in extreme heatwaves and coastal sea level rise.[104] "The rate of surface temperature increase has generally been more rapid in Africa than the global average, with scientists expressing high confidence that human-induced climate change is the dominant driver".

Though the IPCC report documents global warming with increases of at least 1°C in the continent regions, the report states that this may rise to the perhaps unavoidable 2°C in global warming, as early as 2050 with the result been an increase in drought and dangerous fire weather with impacts to agriculture, forestry, health and ecosystems.[105] "In both the west and South Africa, temperature projections are expected to increase by a range of between 3°C and 6°C by the end of 21st century".

[104] IPCC. Sixth Assessment Report: Working Group I – The Physical Science Basis: Regional fact sheet – Africa (2021): 1-2
[105] Ibid, pp 4-5

"Much high warming rates are projected over the semi-arid areas in western, East Africa and Southern Africa. Over North Africa, both annual minimum and maximum temperature are expected to increase but with significant increase in minimum temperature as opposed to maximum temperature".[106]

Drought is an element of the natural variability in Africa's climate, with quite high intensities at monthly, yearly, decadal, or century timescales.[107] In the past, most extreme and prolonged droughts were recorded including the North-Western Africa drought between 1999-2002, the Western African drought in the 1970s and 1980s, the Eastern Africa (Horn of Africa) 2010–2011 drought and the 2001–2003 Southern and South-Eastern Africa drought. The recurrence of droughts in Eastern Africa since 2005 has intensified from 1 in every 6 years to 1 in every 3 years.[108]

3.2 Climate Change and Human Security Nexus in Africa

Climate change impacts on human security in different ways across Africa. This section discusses the nexus between climate change and human security across the region of Northern Africa, Southern Africa. East Africa and West Africa.

[106] Ibid, pp 7-9
[107] Chilunjika, A., and N. Gumede. "Climate Change and Human Security in Sub-Saharan Africa." African Renaissance 2021, no. si1 (2021): 13-37.
[108] Sirba, Husen Yesuf, and Temesgen Begna Chimdessa. "Review of Impact of Climate Change on Food Security in Africa." (2021).

3.2.1 Climate Change and Human Security in Central and West Africa

One of the areas that has attracted the interest of scholars in recent times in West Africa on climate change impacts is Lake Chad and its surrounding Basin (LCB). Approximately 50 million people depend on the lake for water and food. Of these, climate change impacts in the Lake basin have displaced approximately 2.5 million, severely made around 7 million are food insecure while an estimated 11 million are in need of humanitarian assistance. Lake change sensitivity to climate change is because it is only a few meters deep and climate change variability in the region has only served to recede the surface water faster than expected. [109]

Climate change has exacerbated interannual variability in the LCB with the region more susceptible to more extreme rainfall and drier dry periods. The risk of catastrophic floods, amongst other conditions, have led to loss of livelihood and destruction of property in the region. The decrease in regular and access to water has only served to decrease the access to arable land, with millions of people increasingly forced to survive on thinner land margin in the region.[110]

Dramatic changes to weather patterns in LCN region have exposed many farmers in the region to food insecurities due to farmers missing planting seasons. In the Niger's Diffa region in the west of the LCB, for example, crop failures have worsened in the past five years leading to rise in food insecurity and likelihood of outright violence due to fight and tension resources. The likelihood of

[109] Dickerson, Sarah, Mallory Cannon, and Brian O'Neill. "Climate change risks to human development in sub-Saharan Africa: a review of the literature." *Climate and Development* (2021): 1-19.
[110] Ague, Alain Ibikunle, Cyr Gervais Etene, Somiyabalo Pilabina, Ibouraima Yabi, Waza Mulualem Abera, and Wang Wen. "Climate Change and Sensitivity of Surface Water Resources in the Mekrou Sub-Watershed at the Yakrigourou Outlet (North Benin/West Africa)." International Journal of Environmental Monitoring and Analysis 9, no. 3 (2021): pp. 41-60.

transmission of infectious diseases has increased in Niger's Diffa region for over half the population due to lacks access to potable water worsened by climate change.[111]

Increased contact and competition over scarce resources has increased in the LCB region. Following the receding parts of Lake Chad recede or flood, pastoralist and agriculturalist comes into increased contact leading to classes. Recent examples "include recurrent clashes between Shuwa Arabs from the Chadian east and the Fulani pastoralists from the Nigerian southwest over limited fishing and pastoral opportunities at the Lake's southern pool". "Climate change has also driven nomadic Fulani herders of the Sahel further south, where they compete for access to land and water with settled Zarma farmers. Sporadic ethnic violence has erupted on a local scale, which has caused casualties in the Sahel region".[112]

According to International organization of migration report, an estimated 6, 005 000 were forcibly displaced in Central and West Africa. Of these, approximately 300,000 individuals, were displaced by natural disasters as highlighted in the IOM reports that shows that disaster -induced displacements in the region are mainly due to floods. As a consequence of damages associated with floods, food insecurity challenges have increased in LCB.[113]

[111] Ibid, pp 56
[112] Bayala, Jules, Catherine Ky-Dembele, S. D. Dayamba, Jacques Somda, Mathieu Ouédraogo, Adama Diakité, Adéyèmi Chabi et al. "Multi-Actors' Co-Implementation of Climate-Smart Village Approach in West Africa: Achievements and Lessons Learnt." *Frontiers in Sustainable Food Systems* 5 (2021): 120, pp 1-17
[113] Ibid, pp 3-6

The continuation of increased warming (1.5–6.5°C) has produced "significant stresses on farming, access to water resources and their management, urban planning, and people's everyday lives and security". [114] Aning also notes that there exists a strong connection between worsening human insecurity and rise in climate change in western Africa. In West Africa, "ordinary people are experiencing the changes in climate in very extreme, dangerous ways". Along the "coastal belt of West Africa, Liberia, Sierra Leone and the southern part of Côte d'Ivoire are areas that have always experienced predictable rains because of their vegetation". "Now they, together with Ghana, Benin and Togo, are beginning to have flash floods. The rains are torrential, and so heavy that they threaten communities' survival as they wash away the fertile topsoil negatively affecting agricultural productivity and food insecurity more so the production of maize and other staples". [115]

The recognition of climate change on conflicts has also been recognized by AU. "In March 2021, the African Union Peace and Security Council (AU PSC) issued an unprecedented communiqué dedicated to the effects of climate change on peace, security and stability in Africa". It was the first AU communique that not only recognized the importance to address climate change in Africa but urged for the setting up of an AU Special Fund for Climate Change. AUPSC linked rise in global warming in Africa to increased risk of deadly conflict" by exposing and exploiting existing vulnerabilities[116]. A recent study by SIPRI details how climate variability in Mali have impacted violence and insecurity.[117]

[114] Leal Filho, Walter, "The influence of ecosystems services depletion to climate change adaptation efforts in Africa." Science of the Total Environment (2021): 146-159.
[115] Ibid, pp 148
[116]Cepero, Oriol Puig, Sophie Desmidt, Adrien Detges, Fabien Tondel, Pia Van Ackern, Adrian Foong, and Jan Volkholz. "Climate Change, Development and Security in the Central Sahel." (2021): 1-46
[117] Aminga, Vane Moraa, and Florian Krampe. *Climate-related security risks and the African Union.* Stockholm International Peace Research Institute, 2020: 1-23

"Unreliable rainfall and land degradation have contributed to lower crop yield in the Sahel region. With a 3% annual population growth, the result is escalating competition over increasingly scarce resources in the region. This contributes to intra-communal conflict. With endemic disputes between farmers and herders in Mali and across the Sahel, the potential for escalation is high. At the same time, traditional conflict management systems have relatively broken down".[118]

Desertification and climate related hazards contribute to increased natural resource pressure. Limited access to arable land and low availability of safe sources of water are the predominant characteristic of the Sahel. The area's desertification is anticipated to effect almost 70 million people and its fluctuation will affect about 30 million people in the vicinity of Lake Chad. Changes in the precipitation patterns are increasingly affecting the farmers and pastoralist resource dependence in the region worsening the risk of tensions.[119]

"The Sahel region, affected by climate change and conflict, is considered to be one of the most 'fragile environments' in Africa. In 2012 drought affected approximately 18 million people. By 2014, over 23 million people were affected by food insecurity. In 2018, 24 million people required humanitarian assistance due to the effects of climate change and conflict. 32 million people were affected by food insecurity, with approximately 11 million severely insecure and 4.7 children struggling with malnourishment. Over 5 million refugees and IDPs have been forcibly displaced".[120]

[118] Ibid, pp 12
[119] Brief, SIPRI Policy. "Climate-Related Security Risks and the African Union." (2020): 1-45
[120] Yobom, Oudah. "Climate Change, Agriculture and Food Security in Sahel." PhD diss., Université Bourgogne Franche-Comté, 2020. Pp 1-247

In the Sahel, an area stretching from Mauritania to the Sudan, the UN Bureau for West Africa (UNOWAS) says that the fights between farmers "continue with some of the most violent local conflicts." The region is currently defined by the "frequency and severity of conflicts between farms and herders locally and across domestic borders across the Lake Chad Basin and Western Sahel." Due the changes in precipitation, increase in droughts has exposed over 2.5 milion families in greater sahel region to food insecurity and water insecurity vulnerabilities.

3.2.2 Climate Change and Human Security in East Africa

The food security across East African countries of Ethiopia, Somalia, Kenya and Uganda is seen to have steadily deteriorated in mainly due to a poor below average rainfall in 2016-2018. According to IGAD report, the climate change situation in the region has worsened for the year 2008-2018. As a result, "an estimated 15 million of citizens in Ethiopia, Kenya and Somalia, many of them children, are estimated to be severely food insecure by 2019".[121]

In Eastern Africa, over 13 million individuals have been affected by drought. Furthermore, between 2010 and 2011, droughts have been experienced in the horn of Africa, which includes Somalia, Eritrea, Djibouti and Ethiopia. These droughts caused food insecurity issues that affected around 20 million people, resulting in significant loss of lives.[122] In Kenya, Ethiopia and Somalia, drought contributed to socio-economic instabilities, with over 250,000 deaths been recorded in Somalia during the same period. Given the rise in global warming and climate change it is expected

[121] Codjoe, Samuel Nii Ardey, and D. Yaw Atiglo. "The implications of extreme weather events for attaining the sustainable development goals in sub-Saharan Africa." Frontiers in Climate 2 (2020): 18., 1-17
[122] Chilunjika, A., and N. Gumede. "Climate Change and Human Security in Sub-Saharan Africa." African Renaissance 2021, no. si1 (2021): 13-37.

that droughts will intensify in East Africa in the next 10 years because of reduced precipitation and/or increased evapotranspiration. [123]

According to data from the IOM Displacement Tracking Matrix (DTM), climate induced disasters are responsible for around half of the internal displacements in Horn of Africa region in 2019. The report also identified that the pastoralists due their vulnerability have been the most affected by climate change impacts in the region. The worsening of climate change according to IOM-DTM report makes pastoralism poorer with successive droughts, most of the pastoralism are forced to give up on pastoralism and move into urban centers to seek new livelihood opportunities.[124]

Displacement from climate related event in East Africa is varied across different countries. In Ethiopia, the approximately 504,000 people out of 1, 556, 000 people displaced were primarily because of the disasters, and of those, approximately significant portion was represented by flood disaster in comparison to drought. In Somalia, climate events such as drought have contributed significantly to the displacement of over 1,318, 000 people in the country between 2016-2018.[125]

The IOM-DTM reports documents that displacement and loss of lives and livelihoods due to flash floods in greater horn of Africa. For instance, Flash floods along river Juba in Somalia has contributed the displacement of vulnerable individual along the Shebele region. In Burundi, torrential rains have led to the displacement of approximately 300,000 individuals. As of 31

[123] Seife, T. K. "The Impact of Climate Change on Agriculture and Food Security in the Greater Horn of Africa." *Politikon* 48, no. 1 (2021): 98-114.
[124] Seife, T. K. "The Impact of Climate Change on Agriculture and Food Security in the Greater Horn of Africa." *Politikon* 48, no. 1 (2021): pp 98-114.
[125] Tegebu, Fredu Nega. "Climate Change-Induced Migration in the Horn of Africa." (2020), pp 1-16

December 2019, an estimated 5million refugees and 8 million IDPs existed in the sub-Saharan Africa, with around 15% of refugees and IDPs linked to climate variability. [126]

A shift in distribution of some vector-borne diseases has been experienced due to climate change". For instance, "malaria is spreading into the highlands of Kenya, Ethiopia, Burundi and Rwanda where it was previously absent". In general, a rise in the malaria risk is expected rise in eastern Africa. In the eastern Africa region, more people (between 40 and 80 million) are expected to become vulnerable to the disease in a situation where temperature will rise by less that 20C from around 70–170 million under 40C warming. However, it is not absolutely clear how the distribution of malaria is expected to occur because of the complexity of the climatic and non-climatic factors in East Africa. [127]

3.2.3 Climate Change and Human Security in Southern Africa

In Southern Africa, climate change has led to human insecurities in different ways. Over the past decade (2009-2018) with climate variability, the number of people in need of food assistance in the region has continued to increase totaling to around 14 million in 2019. Poor rainfall deficit over the same period has led to a fall in the regional aggregate cereal output was to about 30 million tonnes below the average in the period 1999-2008 period.[128] The decline in production was reported mostly in Mozambique, South Africa, Zambia and Zimbabwe. Climate related events such as Tropical Cyclones which have worsened in the region from 2016 led to the destruction of

[126] Ibid, pp 8
[127] Yellapu, Vikas, Samuel Malan, Brandon Merkert, Hetal Kharecha, Ambreen Alam, and Stanislaw P. Stawicki. "Impact of Climate Change on International Health Security: An Intersection of Complexity, Interdependence, and Urgency." In Contemporary Developments and Perspectives in International Health Security-Volume 2. IntechOpen, 2021.
[128] Matebesi, Sethulego. "Mining, environmental changes and human security in South Africa." In Handbook of Security and the Environment. Edward Elgar Publishing, 2021, pp 1-36

an estimated 506 000 ha of crops in SADC region worsening food security. The UNHCR also noted that intense cyclonic activity of Idai and Kenneth also led to the displacement of approximately 2.3 million people in Mozambique and affecting thousands as refugees.[129]

"Climate change increases the frequency of extreme El Niño events, leading to intensifying droughts, worsening floods, and shifting cyclone patterns. Southern Africa faced its worst drought in 35 years during the 2016 El Nino period. After failed 2018- 19 rains, Zambia faced one of its worst droughts in decades".[130] Poor rainfall seasons in the SADC has only served to expose the highly vulnerable population in the region driving around 2 million individuals to displacements.[131]

Climate change impacts on health security has also been felt in the southern African region both directly and indirectly. The direct climate related determinants of health security are manifested through mortality and morbidity of climate induced diseases in the region. Indirect climate change impacts are linked to water security that have declined across the region. Water scarcity from ground water sources have declined in South Africa, Zimbabwe, Malawi, Zambia, Mozambique and Mauritius. Water scarcity has resulted to lack of universal access to clean water increasing the vulnerability to infectious diseases, with SADC report on climate related risks showing that water-related health problems linked to water scarcity have increased in areas with severe water scarcity in the region.[132]

[129] Ibid, pp 22-23
[130] Verschuur, Jasper, Sihan Li, Piotr Wolski, and Friederike EL Otto. "Climate change as a driver of food insecurity in the 2007 Lesotho-South Africa drought." *Scientific reports* 11, no. 1 (2021): 1-9.
[131] Olabanji, Mary Funke, Thando Ndarana, and Nerhene Davis. "Impact of Climate Change on Crop Production and Potential Adaptive Measures in the Olifants Catchment, South Africa." Climate 9, no. 1 (2021), pp 1-13
[132] Rankoana, Sejabaledi A. "Climate change impacts on indigenous health promotion: the case study of Dikgale community in Limpopo Province, South Africa." *Global Health Promotion* (2021): , pp 1-23

Rainfall in Southern Africa is typically highly variable, with some places in South Africa, Mozambuque, Namibia and Zimbabwe receiving more than 1000 mm per annum of rainfall and tropical cyclones thereby contributing to flooding in South Africa and Mozambique. Flash floods occur during heavy rainfall, tropical cyclones and intense convective storms causing death by drowning, particularly in low-income settlements. Extreme rainfall events in the region have significantly affected the public health of population and ability of population to sustain its livelihood. For instance, major flooding events led to Cholera outbreak in some of SADC countries in the region due to poor hygiene and sanitary conditions. The prevalence of vector-borne diseases such as malaria have also increased from extreme rainfall in Mozambique. [133]

Climate change has led to intensification and frequency of droughts in the region further worsening the food security and nutrition situation in southern Africa.[134] Sethulego notes in their study that following an intensification of drought in west coast in South Africa between 2015-2017, the prevalence of stunting among children under 5 years in western part of South Africa increased. The intensification of droughts in the region has served to increase the use of water resources such as River Zambezi for agricultural purposes. As a consequence, diminishing fish stocks has been witnessed in River Zambezi further contributing to conflicts between farmers and fishermen who blame each other for unsustainable use of the water resources.[135]

[133] Hosea, Patrick, and Ernest Khalema. "Scoping the nexus between climate change and water-security realities in rural South Africa." *Town and Regional Planning* 77 (2020): 18-30.
[134] Ibid, pp 12
[135] Matebesi, Sethulego. "Mining, environmental changes and human security in South Africa." In *Handbook of Security and the Environment*. Edward Elgar Publishing, 2021., pp 1-189

Climate change and rise in global warming in the region has made water availability a challenge and a growing concern in most places across Southern Africa. Changes in the quality and availability of water flowing in stream such as a River Zambezi, Limpopo are already experiencing a decrease by between 20-35%. Besides, a number of residents in cities in South Africa such as Cape town, Ndola, Bulawayo amongst others have been subjected to water rationing in 2019-2020, with water stress in these regions largely attributed to climate variability that has affected rainfall precipitation patterns[136].

3.2.4 Climate Change and Human Security in Northern Africa

Climate change and climate variability in North Africa has led to more frequent and intense droughts in the region. As a result of drought intensification in North Africa, surface water has become insufficient to meet both domestic and farmers irrigation. The decline in groundwater levels in several parts of North Africa has also led to a degradation of water quality in certain regions. Tension over allocation of water sources in dry region of North Africa has been witnessed in different regions.[137] For instance, the over exploitation of ground water for production of Citrus fruits in Southern Morocco's increased water related conflict in the country. Tensions over water, has also been experienced in the region over the use of water for solar plant cooling leading to the rise of 'thirst protests' in Morocco, Algeria and Tunisia due to shortage of water for drinking and domestic purposes. Some of these protests turned violent in violent in Zagora, Morocco.[138]

[136] Moseki, Motlole Christopher. "Mainstreaming Climate Change into Transboundary River Basins: A SADC Regional Case Study." *Climate Change and Water Resources in Africa: Perspectives and Solutions Towards an Imminent Water Crisis* (2021): 433-458.
[137] Tull, Kerina. "The projected impacts of climate change on food security in the Middle East and North Africa (MENA)." (2020), pp 1-201
[138] Westley, Kieran, Georgia Andreou, Crystal El Safadi, Harmen O. Huigens, Julia Nikolaus, Rodrigo Ortiz-Vazquez, Nick Ray et al. "Climate change and coastal archaeology in the Middle East and North Africa: assessing past impacts and future threats." The Journal of Island and Coastal Archaeology (2021): 1-33.

Human-security risks in the region have manifested themselves through rising inequalities that has given rise to socio-economic grievances and protests. In North Africa, agricultural sector is one of the largest employers. [139] The agricultural sector is heavily dependent on rainfall and the worsening of climate change in the region has reduced the agriculture potential in the region leading to job losses.[140]

Urban migration in the region is linked with the loss in livelihoods in the agricultural sector and rural areas in North African states. This is emphasized in the study entitled "the Arab Spring and Climate Change,". The report says that "it was the failure of governments to meet their citizens' basic needs, address climatic issues like droughts, desertification, and power shortages that led many people to take part in the political protests of the Arab Spring, with many of the protestors having migrated from rural to urban centers in search of a better living."[141]

The third strand of climate related insecurities in North Africa largely ties to decline in agricultural productivity and food insecurities is some countries while leading to the contrary on others. Over the 5-year time period of 2015-2019, the North African country of Morocco experienced poor rains that led to reduction in wheat production in the region by approximately 30%. Affected cereal production in the country, where wheat production fell by an estimated 30%.[142]

[139] Zolfaghari, Mehdi, and Farzaneh Jariani. "Food Security in the Middle East and North Africa (MENA)." (2021), pp 1-24
[140] Ibid, pp 12
[141] Khalifa, Sherin, and Christian Henning. "Climate change and civil conflict in SSA and MENA: The same phenomena, but different mechanisms?." (2020), pp 1-32
[142] Ibid, pp 11

Climate change is seen as a contributor to the tension in North Africa over the sharing and use of water bodies. The construction of grand Ethiopian Renaissance Dam (GERD) along river Nile in Ethiopia has stoked tension between Egypt, Ethiopia and Sudan, with the relationship between these countries at its lowest point. Egypt is worried the dam will tamper with the water flows to river Nile thus drastically reduce the water flow to Egypt's freshwater supply. Sudan in joining Ethiopia also asserts its right to exploit the Nile waters for electricity generation and improvement in food security. A failure to agree on the way forward between the three countries could eventually lead to potential conflict between these countries. Although negotiation have taken place, climate change has made it difficult because of exacerbated water shortages.[143]

3.3 Conclusion

Global warming is expected to continue increasing across Africa, for at least 1^0 C in the continent regions. In both the west and southern Africa, temperature projections are expected to continue rising in the 21st century. The different regions of Africa experience climate change impacts variedly. Climate change impact on Western Africa is evident on Lake Chad and its surrounding Basin (LCB) where approximately 50 million people that depend on the lake are exposed to water and food insecurity. The risk of catastrophic floods in the region has increased leading to loss of livelihood and destruction of property in the region. Increased contact and competition over scarce resources has also been witnessed in the region resulting to tensions and conflict over the resources. In East Africa, food security has steadily deteriorated due to climate change hazards from droughts, floods and locust invasion. Climate induced disasters has resulted to rise in internal displacement of persons in East Africa. The changing seasons and unpredictable shifts in weather have provided

[143] Thompson, William R., and Leila Zakhirova. *Climate Change in the Middle East and North Africa: 15,000 Years of Crises, Setbacks, and Adaptation*. Routledge, 2021. Pp 1-32

opportunities for extreme groups such as Al-Shabaab to recruit members from vulnerable individual and communities in ASAL areas thereby perpetuating insecurity and conflict in the region. The distribution of some vector-borne diseases has worsened in the region, with hitherto regions that were least affected, increasing in their prevalence of diseases such as Malaria.

In Southern Africa, climate change has led to human insecurities in different ways. Climate variability in the region has exacerbated food insecurity through decline in production due to floods and droughts in the region. Climate change impacts in the region has also been felt on health security both directly and indirectly. Directly, climate change has resulted to increase in morbidity and mortality while indirectly climate change has resulted to water scarcity increasing vulnerability to infectious diseases. Climate change and rise in global warming in the region has also made water availability a challenge and a growing concern in most places across Southern Africa region.

Climate change and climate variability in North Africa has led to more frequent and intense droughts in the region resulting to water insecurity. The worsening of climate variability in the region has made the exploitation of ground water levels a challenge leading to a decline in agriculture productivity. Climate change is seen as a contributor to the tension in North Africa over the sharing and use of water bodies such as the River Nile.

CHAPTER FOUR: A CRITICAL ANALYSIS OF THE IMPACT OF CLIMATE CHANGE ON HUMAN SECURITY IN KENYA

4.0 Introduction

This chapter critically analyzes the impact of climate change on human security in Kenya. The section is divided into several parts that are deemed important to answering the study hypothesis and research objectives. Generally, the study aimed to analyze the implication of climate change on scarcity of resources and human security in Kenya. This chapter focused on presentation of data findings from primary and secondary data sources. The data reviewed was limited to climate change and human security in Kenya. Through the analyzed data the study has been able to test its hypothesis and respond to the objectives.

4.1 Research Findings, Interpretation and Presentations

This section reviewed the data that was collected by a mix of probability and non-probability techniques. In particular stratified sampling for probability techniques and purposive sampling as the non-probability techniques. [144]The findings emanating from data reviewed are summarized in this section supported by interpretation of research findings and presentation of findings in line with research objectives. Structured interview guide was employed in data collection and a combination of description of correlation analysis were used in generating findings to test the study hypothesis.

[144] Pace, Doreen Said. "Probability and Non-Probability Sampling-An Entry Point for Undergraduate Researchers." *International Journal of Quantitative and Qualitative Research Methods* 9, no. 2 (2021): 1-15.

The data analysis involves the classifying, categorizing ordering, describing and relating data between different constructs to generate knowledge that helped in answering the research questions. This section utilized qualitative and quantitative study approaches, in addition, the findings were form tables and narrative formats. This study employed content data analysis to analyze data from interviewed conducted.

4.1.1 Operationalization of Variables and Data

The field data obtained from the respondents was checked for incompleteness, errors and missing values hence making the data clean and tidy for analysis. Analysis of the data involved describing the variables through means and frequencies and through use of correlation analysis to establish the implication of climate change on human security in Kenya. To help in correlation analysis, ANOVA was employed to provide a model. This provided a test for the study hypothesis through the model below.

$Y=\beta 0 = \beta_1 X_1+\beta_2 X_2+B_3 X_3+ \beta_4 X_4+B_5 X_5 +\varepsilon$

Therefore Y = Climate Change

X_1 = Food Security

X_2 = Health Security

X_3 = Personal Security

X_4 = Water Security

X_3 = Cultural Security

ε = Erroneous variables

$\beta 0$ = regression intercept

The completion rate in the context of the research denotes the number of respondents that completely filled the questionnaire during the data collection. The section found that a total of 27 respondents out of expected 32 respondents successfully completed the structured interview guide and thus this represented 84.3 percent return rate which this research considered not only good for data analysis but suitable in proving valid findings.

4.2 Data Presentation

This section discussed the socio-demographic characteristics of the participants with an aim to analyzing their representation in the study sample. This was considered important since the results of the study were meant to be the representation of both state actors and non-state actor on climate change and human security in Kenya.

4.2.1 Gender of Respondents

From a total of 27 respondents that participated in the study, 18 were males while 9 were females. This suggests that at the time of the study more males than females were accessible. It can also be implied that both gender requirements is realized in the study and to be specific the a third gender rule given that females represented a third of the participants.

Table 4.1: Gender of the Respondents

Gender	Frequency	Percentage
Male	18	66.7
Female	9	33.3
Total	27	100

Source: Author (2021)

The table above indicates that the sample was well representative of both genders as supported by their good representation in the study sample size.

4.2.2 Education Level of Respondents

The distribution of highest level of education shows that most of the respondents had at least master level of education as the highest (12) closely followed by PhD level of education (9) and distantly by bachelor's degree (6).

Table 4.1: Highest Level of Education

Education	Frequency	Percentage
Bachelor's Degree	6	22.2
Master's Degree of Education/Post graduate diploma	12	44.4
PhD Level of Education	9	33.3
Total	27	100

Source: Author (2021)

The table above reveals that all the respondents were exposed to at least degree level of education. This may suggest that all the participants of the study are all fairly exposed to some degree to the topic of the study. This is useful to the study as it helps improve the validity of the research findings.

4.2.3 Working Experience on Climate Related Issues

The distribution of working years' experience on climate related matters appears to show that majority of the participants had worked on climate change issues for a long period (over 10 years).

Table 4.2: Working Experience on Climate Related Issues

Working Years	Frequency	Percentage
1-5 Years	2	7.4
6-10 Years	7	25.9
11-15 Years	9	33.3
16-20 Years	4	14.8
Over 21 Years	5	18.5
Total	27	100

Source: Author (2021)

The evidence presented in table above appears to suggests that majority of the study participants were better placed to report on their knowledge of climate change and human security. This is because these issues appear over time. Hence their long period of working knowledge on climate change increases their objectivity and by extension validity of the research findings.

4.2.4 Categories of the Respondents

The table shows that the respondents from various categories which the study proposed to include participated in the study

Table 4.3: Categories of the Respondents

Categories	Frequency	Percentage
UNEP	21	77.8
Civil Society	4	14.8
Government	2	7.4
Total	27	100

Source: Author (2021)

The above table shows that the sample size came from various categories of participants. This allowed the study to generate correct findings from state and non-state actors on climate change and human security in Kenya.

4.3 Climate Risk Profile

The study adopted the framework by UN and World Bank of climate risk profile assessment in analyzing the nexus between climate change and human security in Kenya.[145] The climate risk profile methodology adopted is organized into four sections, each reflecting an essential analytical step in climate security-human security linkages. The first section offers an overview of the climate risk situation by examining the respondent's knowledge on climatic hazards in Kenya. This is followed by identification of the main drivers of climatic hazards in Kenya. The document continues with an analysis of Climate change and Human security nexus in Kenya and international system.

4.3.1 Current State of Climate Change

The study examined the awareness of the respondents on various climatic hazards that included temperature, floods, droughts, atmospheric concentrations and weather patterns. This approach aligns with the methodology used by Shanzia in his study that investigated the climate change and human security in Africa by focusing on Mau Forest complex in Kenya. [146]

[145] Climate Risk Profile: Kenya (2021): The World Bank Group, pp 1-32
[146] Chaudhry, Shazia. "The Impact of Climate Change on Human Security: The case of the Mau Forest Complex." (2015): 390-398.

As shown in table 4.2.1 the respondents agreed to a great extent that climate changes have caused fluctuation in temperature, resulted to severe and prolonged droughts, severe and frequent floods, increase in Co_2 concentration and change of weather patterns in Kenya. This implies that Climate risk profile of Kenya's is only changing for the worse.

Table 4.4: Knowledge on Climate Change

Response	Mean	Std
The temperature trends in the country are on the rise	4.26	0.447
Severe and prolonged droughts are a common in Kenya	3.70	0.823
Severe and frequent floods are common in Kenya	3.74	0.526
The pattern of weather in Kenya is generally changing	4.22	0.641
Climate change has resulted to increase in current atmospheric concentrations of carbon dioxide (CO2) in Kenya	4.18	0.622
Grand Total	3.88	0.663

Source: Author (2021)

Climate risks pose serious threats to realization of Kenya's sustainable development goals. Analysis of temperature trends in the country over 25 years (1990 to 2015), showed an average increase of about 0.5°C in the mean temperatures over the same period. both seasons. This study aligns with the literature that documents a rising trend in temperatures in Kenya. "These temperature increases occur at all seasons but are more pronounced between March and May". The combination of the moderate increase in temperatures have resulted in an increase in the number of heat stress days in different seasons, as well as an increase in drought risk in Kenya.

The rise in temperature trends across the country has also been presented in a number of studies and reports locally. For instance, a world bank study points to a distinct warming trend in Kenya since 1960s, with an annual increase of "approximately 1.0°C, at an estimated average rate of 0.21°C

per decade"[147]. This supports a report by Kenya metrological department which shows that several regions recorded maximum temperature values exceeding their respective long-term means in 2020.

Figure 4.1: Maximum temperature vs LTM (Kenya Metrological Department)

[147] Climate Risk Profile: Kenya (2021): The World Bank Group, pp 1-32

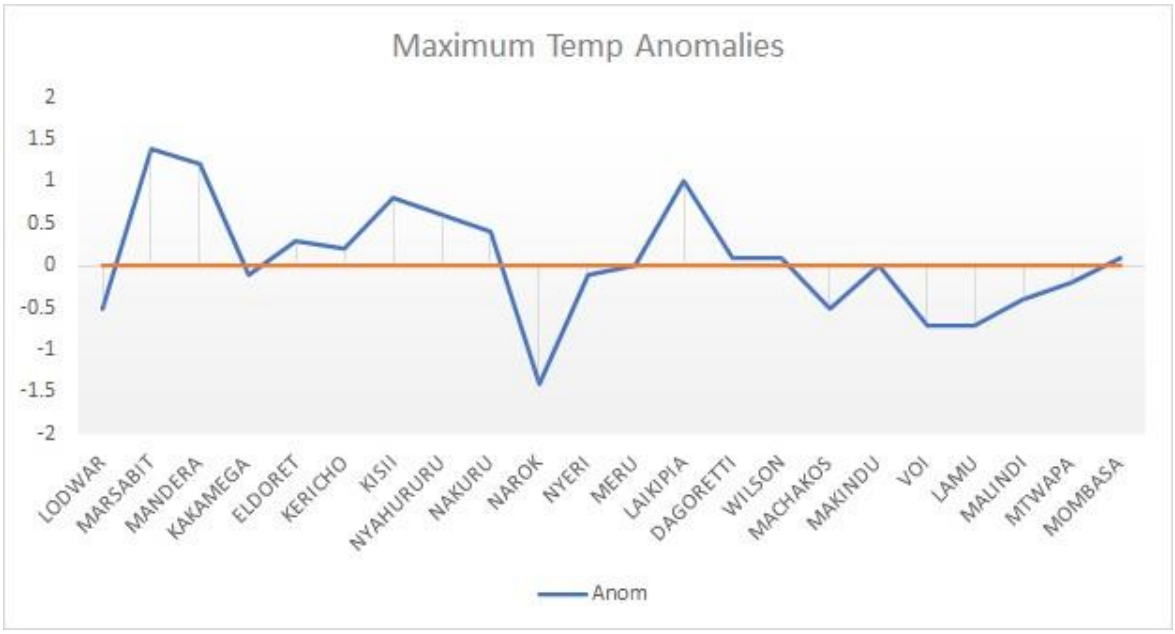

Figure 4.1: Maximum temperature anomalies (Kenya Metrological Department)

The minimum temperatures observed over most Kenya metrological stations in 2020 were also higher than the long-term means. This is consistent with the global observation that identifies the year 2020 as one of the hottest years on record. The minimum temperatures and anomalies are respectively illustrated below.

Figure 4.2: Minimum temperature observed vs long-term mean (Kenya Metrological Department)

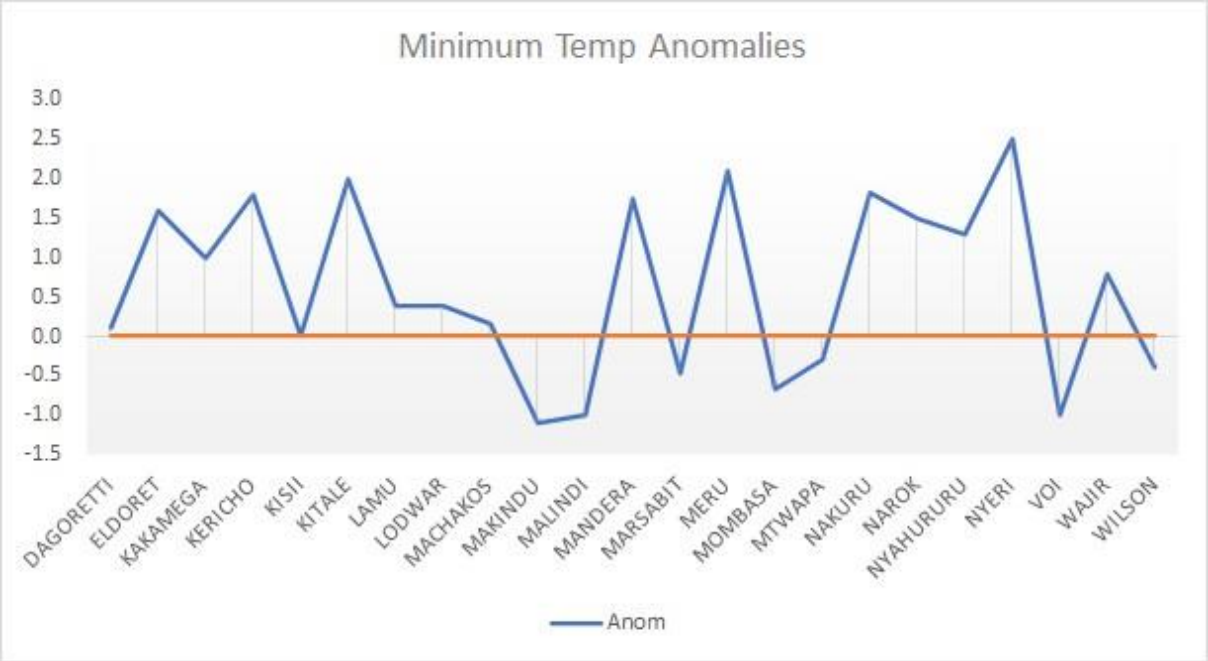

Figure 4.3: Minimum temperature anomalies (Kenya Metrological Department)

A closer look at the counties also reveals a similar climate change situation as evident in counties climate change policies. For instance, in Turkana the county reports that the frequency of weather-related disasters, particularly droughts have increased in the past decades, increasing average temperatures of between 2-3°C, decline in annual rainfall mean and increased variability. The county has also witnessed extreme rainfall and massive flooding that manifests itself through river floods and flash floods.[148]

The general picture of rising temperature in Kenya tends to be more pronounced between certain moths, March and May to be more specific.[149] Temperature rise in the country also varies with

[148] Turkana County Government. Turkana County Climate Change Policy, 2020. Department of Environment, Natural Resources, Water and Tourism. Bungoma (2020)
[149] Government of Kenya. National Climate Change Action Plan (Kenya) Volume 2: Adaptation Technical Analysis Report 2018-2022. Ministry of Environment and Forestry. Nairobi (2018), pp 1-187

some regions reporting higher increases than others as evidenced in the melting of glaciers at Mt Kenya. According to the ministry of environment, only 7 glaciers are remaining as at 2008 from a total of 18 glaciers in 1900[150]. The acceleration of mass loss of glaciers since 2010 has affected the supply of water into two of Kenya's largest rivers: Nzoia and Tana with potential consequences on fresh water supply in the country.[151]

The findings revealed that the respondents were in agreement that severe and frequent droughts and floods have increased in Kenya. This is in support of the assertion by Ayugi et al. who noted in their study that in recent years the frequency of droughts and floods in Kenya risen. Kenya is currently considered prone to natural disaster such as droughts and floods, with statistics ranking Kenya the highest in East Africa.[152] Droughts in Kenya are in some cases, cyclical while floods are seasonal and localized in nature.[153] According to reports by the National Drought Management Authority (NDMA) due to the below normal rainfall, "twelve (12) counties namely Marsabit, Mandera, Garissa, Wajir, Kilifi, Tana River, Lamu, Samburu, Kitui, Lamu, Isiolo, and Laikipia have experience droughts in 2019 and 2020".

Kenya Metrological department in there 2020 report state that there has been a total of 20 flash flooding in the country, with no warning's issues by the department for approximately 6 cases of the flash floods further amplifying the reality of climate change.[154] Related to flash floods, are the

[150] Ibid, pp 24-25
[151] Ibid, pp 26

[152] Ayugi, Brian, Guirong Tan, Rouyun Niu, Zeyao Dong, Moses Ojara, Lucia Mumo, Hassen Babaousmail, and Victor Ongoma. "Evaluation of meteorological drought and flood scenarios over Kenya, East Africa." *Atmosphere* 11, no. 3 (2020): 307-324.
[153] Ibid, pp 313
[154] Kenya Meteorological Department (KMD). State of the Climate in Kenya (2020), pp 1-21

common reported cases of landslides in western parts of the country and some part of central Kenya that have also increased in recent times further leading to destruction of property, displacement of people, loss of lives and livelihoods. Due to increases in precipitation in hitherto areas that commonly receive low rainfall, conditions that are conducive for locust invasion have been created in the country, with scientist attributing the recent locust invasion of 2019 to 2020 to climate variability. The desert locust invasion in the country affected 14 Kenyan counties and gradually spread over into neighbouring countries such as Ethiopia, Somalia and Tanzania. [155]

The respondents were in agreement that the patterns of weather is generally changing in Kenya. Similar views have been expressed by USAID in their climate risk profile of 47 counties in Kenya.[156] Kogo also "asserts that change in rainfall patterns has a huge impact on Kenya because 98 per cent of the country's agriculture is rain fed. The major challenge that farmers face is timing. It is critical for them to know when rains start and stop so that they know when to plant or harvest their crops".[157]

"Most parts of Kenya experience two rain seasons; March to May's long rains and October to December's short ones. The months of June to August are mainly cool and dry over most parts of the country, except for some areas in the western region that get rain. Hot and dry conditions are normally observed in the entire country in January and February. In recent years, delay in the

[155] Ibid, pp, 15

[156] Climate Risk Profile of Kenya. USAID (2018) pp 1-5

[157] Kogo, Benjamin Kipkemboi, Lalit Kumar, and Richard Koech. "Climate change and variability in Kenya: a review of impacts on agriculture and food security." Environment, Development and Sustainability 23, no. 1 (2021): 23-43.

coming of rains has been the norm. In other years, rains came on time but then stopped earlier than anticipated. Such lead to massive crop failures".[158]

Besides precipitation changes, study by Pello also show "a reduction in the amount of rainfall, especially during the March to May long rains' period. This is a worrying trend; given that this is the main planting season across most parts in the country".[159] "The changes in Kenya's rainfall patterns have been linked to climate change. Global warming is known to cause an overall warming in the atmosphere and the ocean, resulting in complex shifts that affect our planet's weather and climate systems".[160]

4.3.2 Drivers of Climate Change in Kenya

The study sought to determine the drivers of climate change in Kenya. Statement on the following drivers: human activity, deforestation, developed countries, natural changes, agriculture and large enterprise were asked to the respondents. From the study findings, the respondents agreed to a great extent that deforestation, human activity, developed countries, agriculture and large enterprise are some of the drivers of climate change in that order. All these statements reported a mean of 3.70 and above. It was further observed that the respondents agreed to a moderate extent that natural changes is a cause of climate change. It can be seen from the grand total mean that the respondents consider climate change to be caused by various factors.

[158] Pello, Kevin, Cedric Okinda, Aijun Liu, and Tim Njagi. "Factors Affecting Adaptation to Climate Change through Agroforestry in Kenya." *Land* 10, no. 4 (2021): 371-386.
[159] Ibid, pp 379
[160] Intergovernmental Panel on Climate Change. Global warming of 1.5° C: an IPCC special report on the impacts of global warming of 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Intergovernmental Panel on Climate Change, 2019.

Table 4.5: Drivers of Climate Change in Kenya

Drivers	Mean	Percentage
Human activity is responsible for climate change	4.07	0.55
"Deforestation is one of the main causes of climate change"	4.37	0.492
"Developed countries such as United States and China take most of the blame for climate change"	3.85	0.662
"Natural changes in the environment are responsible for climate change"	2.85	0.662
"Agricultural elements, such as methane from livestock and manure and nitrous oxide emissions from fertilizers is a contributor to climate change"	3.81	0.681
Carbon emissions from vehicles and large businesses are major contributor to climate change	3.78	0.577
Grand Total	3.79	0.687

Source: Author (2021)

Climate change is linked to various drivers. The drivers of climate change make the country vulnerable to different climatic hazards, with the situation becoming more pronounced in areas of high climate risk profiles such as ASAL (arid and semi-arid areas of the northern and eastern areas). Climate change factors occur at social, economic, political, demographic and environmental factors. The combination of these factors may worsen the climate change situation in Kenya resulting to climate change effects.

The respondent agreed that human activity is responsible for climate change. This implies that the increase in the frequency and intensity of extreme weather events is due to human activities continuously releasing greenhouse gases into the atmosphere. Agriculture according to World Resources Institute of Climate Analysis is the main source of GHG emissions in Kenya "contributing 62.8% of total emissions, within agriculture, 55% of emissions were due to enteric

fermentation from livestock and 36.9% due to manure left on pasture.[161] Energy is the second largest source of emissions (31.2%), with other fuel combustion and transportation contributing 74.3% of energy emissions. Industrial processes (IP) and waste contributed 4.6% and 1.4%, respectively". [162] Indications that that increasing greenhouse gas (GHG) concentrations play some role in recent climate changes in Kenya has been reported in climate change model study by Zaman.

Greenhouse gas (GHG) emissions from agriculture manifest itself through on-farm production (i.e., within the farm gate and its related land use that accounts for about one-fifth to one-quarter of total emissions linked to human related activities. The prominence of this contribution in terms of individual gases is more revealing. For instance, half of methane and three quarters of nitrous oxide emissions is linked to crop and livestock production. This only serves to potential role that agriculture plays in green house emission in Kenya through global lens.[163]

Emissions from off farm related activities at pre- and post-production activities such as processing, retail, food transport, waste disposal and fertilizer manufacturing further increases the magnitude of agriculture contribution to green-house emissions in agriculture-based economy such as Kenya. Pastoralism is the main economic livelihood practiced by over 80% of the total population of Turkana County.[164] Cumulatively the huge herds own by individual pastoralist not only led to

[161] GHG Emissions Factsheet Kenya. USAID (2017). pdf
[162] Zaman, M., K. Kleineidam, L. Bakken, J. Berendt, C. Bracken, K. Butterbach-Bahl, Z. Cai et al. "Greenhouse Gases from Agriculture." In Measuring Emission of Agricultural Greenhouse Gases and Developing Mitigation Options using Nuclear and Related Techniques, pp. 1-10. Springer, Cham, 2021.
[163] Nyika, Joan Mwihaki. "Climate Change Situation in Kenya and Measures Towards Adaptive Management in the Water Sector." *(IJESGT)* 11, no. 2 (2020): 34-47
[164] Heiret, Tiril. "The Impact of Climate Change Induced Resource Scarcity on Human Security: An Analysis of Experiences by Families in Lokichoggio, Turkana County, Kenya." PhD diss., United States International University-Africa, 2020: 1-220

destruction of the scare vegetation and exposing the land to the agents of erosion but are also a major source of greenhouse gases for instance methane contributing to the effects of global warming.[165]

Human activities have also been manifested through development activities in Kenya. The country is experiencing rapid increase in population. This has led to the need of robust development in infrastructure, housing among others. All these are geared towards meeting the present need and rising demand of modern services by the ballooning population. In order to create space for development, land is cleared for settlement, agriculture and infrastructure. Settlement results to increased consumption of energy, electricity, food, transport services, waste generation thus increasing emission of greenhouse gases that graduate to global warming in the country. [166]

Study findings presented by the Heiret similarly established that drivers of climate change in Kenya include human related activity, agriculture, deforestation and industrial pollution. The findings also confirm the assertion in Turkana.[167] and Baringo County[168] Climate change policies study which demonstrate that human related activities on agriculture, settlements and deforestation are the main contribution to climate variability in counties.[169]

[165] Ibid, pp 108
[166] Kalele, Dorcas N., William O. Ogara, Christopher Oludhe, and Joshua O. Onono. "Climate Change Impacts and Relevance of Smallholder Farmers' Response in Arid and Semi-Arid Lands in Kenya." *Scientific African* (2021): 1-24
[167] Heiret, Tiril. "The Impact of Climate Change Induced Resource Scarcity on Human Security: An Analysis of Experiences by Families in Lokichoggio, Turkana County, Kenya." PhD diss., United States International University-Africa, 2020: 1-220
[168] Chemeli, Angelah, Joseph M. Njoroge, and Peace B. Agufana. "Climate change and immovable cultural heritage in Kenya: impact and response strategies." (2021), 1-112
[169] Heiret, Tiril. "The Impact of Climate Change Induced Resource Scarcity on Human Security: An Analysis of Experiences by Families in Lokichoggio, Turkana County, Kenya." PhD diss., United States International University-Africa, 2020: 1-220

Climate change variability in Kenya is largely linked to poverty. Poverty drives many to embrace poor agricultural practices, engage in deforestation and other human related activities. This aligns with the released IPCC report that identifies human influence as the main driver of the climate change.[170] The reports go further to state that poverty in developing countries leads to human related activities that causes increase climate variability in the longrun. Poverty as a moderating factor to climate change variability is made worse by a steady population growth rate, high population density and decreasing agricultural productivity.

A combination of low agricultural productivity and a rapid population growth rate increases human related activities leading to environmental degradation. Environmental degradation linked to human related activities is acknowledged as the main cause of climate change in Bungoma county. According to Bungoma Climate change policy the key drivers of environmental degradation are linked to human related activities such as uncontrolled and illegal logging, charcoal burning, demand for wood fuel and increased encroachment on riparian and gazetted areas.[171]

The study findings reported that the respondents agreed that deforestation is one of the main causes of climate change in Kenya. This concurs with the findings reported by that deforestation in water towers such as Mt Kenya and Mau Forest by human habitation or illegal logging is a contributor to climate change. Forests act as carbon sinks and their destruction due to deforestation and other activities only contributes to more and more carbon dioxide building up in the atmosphere. The build-up of carbon dioxide in the atmosphere is a driver to warming, evidence in temperature

[170] Ibid, pp 124

[171] Bungoma County Government. Bungoma County Climate Change Policy, 2020. Department of Environment, Natural Resources, Water and Tourism. Bungoma (2020), pp 1-56

change in Kenya over the past 4 decades. "Kenya's annual population growth stands at 2.3% and the increasing population has brought immense pressure to bear on forests making it difficult to realize the 10% forest cover target that can to some good proportion act as carbon sinks".[172]

4.4 Climate Change and Human Security Nexus in Kenya

This section provides correlation analysis results on the nexus between climate change and human security nexus in Kenya. This was analyzed through examining the nexus between climate change and human security at the first stage. The following key was used in establishing the strength of the relationship: 1-3 weak relationship, 4-6 moderate relationship and 7-10 strong relationship. The strength of the relationship was measured through coefficient of determination (r). The analysis was performed through SPSS version 24. Climate change was largely measured through increases in climate hazards while some of the human security aspects were measured via reduction. Hence it was important that transformation of variable for both climate and human security be done through recoding. This ensured that all the variable used were in one direction thus allowing for correlation.

Table 4.6: Relationship between Climate Change and Human Security

		Climate Change	Human Security
Climate Change	"Pearson Correlation"	1	.796**
	"p-value"		0.001
	N	27	27
Human Security	"Pearson Correlation"	.796**	1
	"p-value"	0.001	
	N	27	27

** "Correlation is significant at the 0.01 level (2-tailed)".

Source: Author (2019)

[172] Turkana County Government. Turkana County Climate Change Policy, 2020. Department of Environment, Natural Resources, Water and Tourism. Turkana (2020), pp 1-61

The study found out that the analysis of climate change relationship with human security had a coefficient of determination of 0.796 and significant at 0.01. Climate change had a positive relationship with human securities. This suggests that climate change contributes to human insecurity across Kenya. The relationship between climate change and human security is also presented in visual form through scatter plot in figure 4.2.5

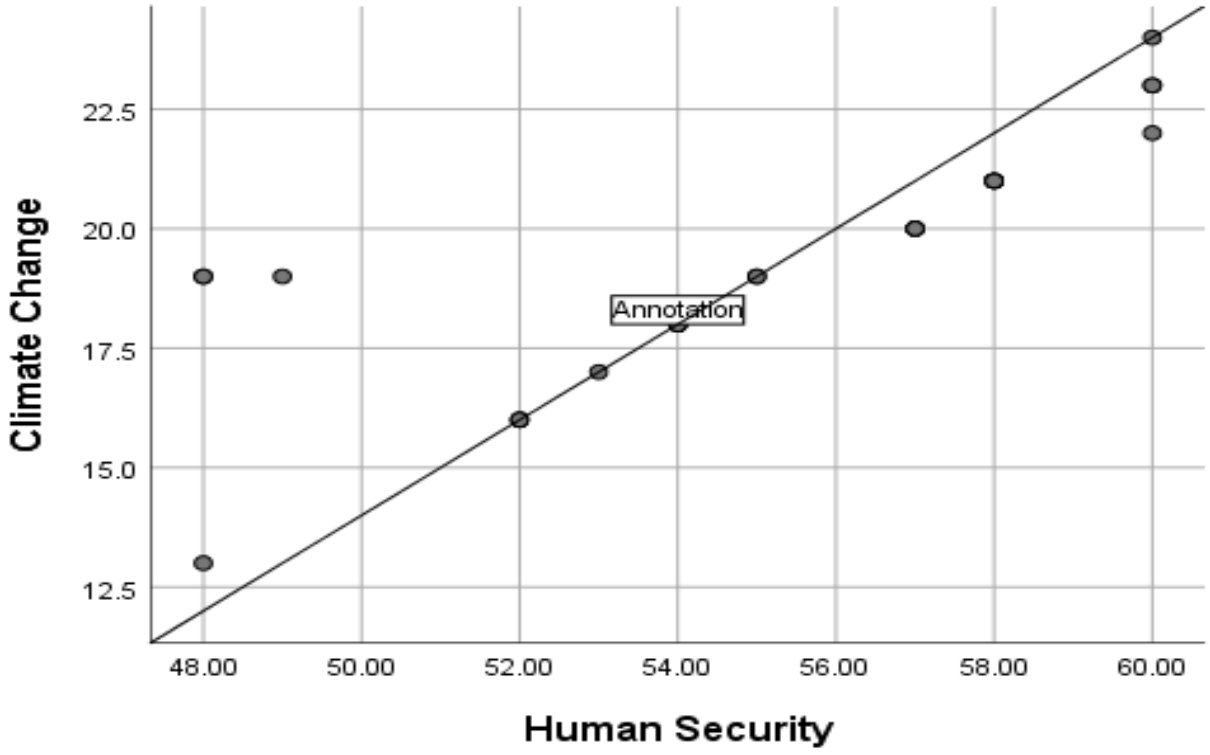

Figure 4.4: Correlation of Variables
Source: Author (2019)

The visual representation of climate change-human security nexus shows that climate change and human security relationship manifest itself in a positive trend. It can be deduced that climate change to some extent also affect the various components of human security such as food security, water security, personal security, health security and cultural security.

4.5 Climate Change and Human Security Components Nexus in Kenya

Climate change phenomena affects the environment, natural resources, socio-economic welfare and economic development. Climate Change is the most challenging developmental issue in the present age. This section analyzes the relationship between climate change and human security aspects in Kenya through correlation co-efficient table. This section presents the findings on the relationship between climate change and various aspects of human security such as personal security, food security, water security, agriculture, cultural security and health security.

Table 4.7: Relationship between Climate Change and Selected Human Security Aspects

		Climate Change	Food Security	Health Security	Personal Security	Water Security	Cultural Security	Human Security
Climate Change	Pearson Correlation	1						
	Sig. (2-tailed)							
Food security	Pearson Correlation	0.81*	1					
	Sig. (2-tailed)	0.048						
Health Security	Pearson Correlation	0.173*	0.154	1				
	Sig. (2-tailed)	0.038	0.442					
Personal Security	Pearson Correlation	0.352*	0.2	0.49*	1			
	Sig. (2-tailed)	0.018	0.318	0.032				
Water Security	Pearson Correlation	0.712*	0.09	0.24*	0.13	1		
	Sig. (2-tailed)	0.028	0.654	0.036	0.518			
Cultural Security	Pearson Correlation	0.153	0.19	0.047	0.077	0.073	1	
	Sig. (2-tailed)	0.057	0.342	0.817	0.704	0.719		

Food security revolves around "ensuring that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life".[173] Findings of the study indicated that climate variability is strongly and positively related with food insecurity and in Kenya.

Climate change has far-reaching effects on food security in several respects. The dependency on rain-fed agriculture increases the vulnerability of crop and livestock production to climate change. For instance, frequent droughts often lead to delay in planting contributing to subsequent crop failure, frequent flash floods sweep away farm crops while hailstones destroy crops leading to low yields. As a consequence, the production of staple foods such as maize and beans, are affected exposing individuals and communities to food insecurity. The mix and distribution of agriculture pests are likely to be altered by rising temperatures. This affects the yields of staple and cash crop due to increased presence of pests and diseases.

Climate changes not only affects crop production, but also livestock production. Frequent and severe droughts in ASAL areas have led to deteriorating pasture conditions, decreased water availability, livestock undernourishment and losses. Livestock morbidity and mortality due to climate variability may also increase due to the association of some diseases to periods of extreme temperature and precipitation. Additionally, "post-harvest grain loss due to bad weather" is another effect linked to climate change. For instance, inadequate sunlight may expose farmer to post harvest losses due to lack of sufficient sunlight to dry and store agriculture produce.

[173] Kabubo-Mariara, Jane, and Millicent Kabara. *Climate change and food security in Kenya*. Routledge, (2018): 25-60

The study findings agree with assertion in Turkan county climate change report that showed that "nearly half of the Turkana population are chronically food insecure in 2019 due to increase in climate change hazards in the county".[174] Further evidence to the study findings is also supported by Mahrous conclusion that climate change variability of precipitation and temperature all leads to food insecurity in Kenya.[175].

From the study findings, climate changes were found to have a weak and positive relationship between with health insecurity in Kenya. This was attributed by some of the respondents to the indirect effect of climate change on health security. Climate change is related to health security through direct and indirect pathways. Climate change events such as droughts have negative effects on the health when the co-occur together with various health risks. For example, increase in climatic hazard events may create environmental conditions that lead to rise in "infectious diseases such as food or waterborne diseases like diarrhoea, hepatitis A, and typhoid fever". "Vector-borne diseases such as malaria, dengue fever, and Rift Valley Fever amongst others which are also common in climate risk areas". "High temperatures and intense rainfall, which are some of the effects of climate change, are known to be critical factors some of these diseases across the country. initiating malaria epidemics in the Country".

[174] Turkana County Government. Turkana County Climate Change Policy, 2020. Department of Environment, Natural Resources, Water and Tourism. Bungoma (2020): 1-77

[175] Mahrous, Walaa. "Climate change and food security in EAC region: a panel data analysis." *Review of Economics and Political Science* (2019): 1-19

Climate change effect on health security also occurs through indirect pathway by affecting the environment and ecosystem. For instance, the impact on water ecosystem results to reduction in the quality and quantity of water available that affects crop production and food security. Reduction in quality, quantity and variety of food available to individuals exacerbating undernutrition and malnutrition. This may lead to increased cases of morbidity and mortality due to impaired immune system among individuals experiencing food insecurity. The results coincide with the findings of a "world bank report that shows that climate change has a low and indirect effect of climate change on health security in Kenya", more so through indirect pathways of disease-causing pathogens.[176]

Personal security is an important element in human security paradigm. The study sought to investigate how personal security is affected by climate change in Kenya. The investigations revealed that climate change has a weak relationship with personal security in Kenya. This according to the respondents is because climate change and personal security or conflicts are seasonal in nature. Conflict regarding "access to resources such as land, water" and food scarcity mostly occurs in periods of droughts.

The findings show that climate variability is considered as a significant risk factor for personal insecurity. Decline in natural resources such as water, pasture and land may bring with hardship to those who depend on them. This increases the likelihood of contention and disputation over these depleted resources increasing the likelihood of conflict. External and internal conflict is linked to hardship arising from resource scarcity during period of prolonged and severe drought.

[176] World Bank. Kenya Climate Risk Profiles (2020): 1-67

During prolong and severe drought, there is scarcity of pasture and water, which increase the possibility of migration among pastoralists. Scarcity of water and pasture is seen as motivation to engage in raids as it provides opportunity to restock. Climate change is perceived as creating a cycle that perpetuate conflicts in ASALs areas. Climate change through severe floods can also acts as potential sources of conflict. Flood results in destruction of property and resources as well as losses of lives which affect people's living standards. This forces many persons to rebuild their lives again through seeking for places to live and build new houses etc. Experience emanating from this process may be frustrating thus breeding conflicts in communities.

The results closely match those obtained by Heiret in Turkana County. The study reported that climate change affects personal security and conflict during periods of droughts and floods. The author explained that droughts are the most common risk factor for conflicts in the county because pastoralism is still a mainstay economic activity in the county[177].

The lack of water as a vital resource leads to occurrence of droughts. Given the importance of these resource this section aimed at investigating the "impact of climate change on water security in Kenya". The results indicated that climate change and water security have a strong positive relationship. According to most of the respondent's climate change affects water accessibility and availability in the country since most regions largely rely on ground water sources that is dependent on rainfall patterns across the country. This limited ground water storage capacity worsens with climate change.

[177] Heiret, Tiril. "The Impact of Climate Change Induced Resource Scarcity on Human Security: An Analysis of Experiences by Families in Lokichoggio, Turkana County, Kenya." PhD diss., United States International University-Africa, (2020):1-220

Population growth and forest deforestation practices have also worsened the water security situation. The precipitation changes due to climate change "further reduce the reliability of unimproved groundwater sources and surface water sources during droughts". Water quality and content for human consumption is also greatly affected during droughts due to sedimentation process. "Climate change affect both the quantity and quality of water and these factors influence accessibility and availability of the resource for human and non-human uses".

The results agree by and large with those reported in a study of world bank that reported that "climate change has affected the accessibility and availability of water to poor and vulnerable households in Kenya".[178] Similar views were reinforced in the study by Nyika who established that climate change has affected water security in Kenya to a great extent due to our dependence on ground and surface water.[179]

Cultural security refers to a "protection of broadly defined culture, including tangible culture heritage (cultural sites, objects and artefacts) and non-tangible culture (cultural values, religion, language, identity)".[180] The findings o revealed a non-significant and weak relationship between climate change and cultural security. This according to some of the respondents is for the reason that climate change impacts on cultural security requires a much longer period to be manifest.
"Climate change has the potential to induce a variety of physical and social-cultural changes that affect human populations considerably". "One major cultural security concern is the loss or

[178] World Bank. Kenya Climate Risk Profiles (2020): 1-50
[179] Nyika, Joan Mwihaki. "Climate Change Situation in Kenya and Measures Towards Adaptive Management in the Water Sector." *(IJESGT)* 11, no. 2 (2020): 34-47.
[180] Krupocin, Dominika, and Jesse Krupocin. "The Impact of Climate Change on Cultural Security." *Journal of Strategic Security* 13, no. 4 (2020): 1-28.

destruction of habitable lands due to deforestation occasioned by human activity or wildfires". "Cultural identity of indigenous communities is greatly affected by deforestation that results in the loss of territory and access to resources". "The well-being of indigenous populations and the preservation of their unique cultures, knowledge, and languages is affected by loss of territory occasioned from climate change human induced activities such as deforestation".

The results generally agree with those obtained in the study by wily. The author reports in her study that Climate change occasioned by deforestation has likely contributed to the endangering of indigenous communities in the Mau such as Ogiek community. The destruction of their habit through encroachment by other communities has made it difficult for the government to restore the Ogiek to their ancestral forest habit following African court ruling. The government attributes this to fear of other communities encroaching the forest to continue the destruction of forest habitat. The decision according to the author has made the Ogiek community vulnerable and at risk of losing their cultural identity. [181]

4.5 Climate Change and Human Security Nexus in the World

This section indicates the respondent views on the nexus between climate change and human security in the world. This was examined through the questions on climate change aggravation on existing human security problems in different regions of the world and the climate change risks to water, food, health and cultural systems across the world. Rate of response in regard to the climate

[181] Liz Alden Wily. Can Ogiek Rehabilitate and save May Forest for the Long Term? In collected essays in Defending Our Future Overcoming the challenges of returning the Ogiek Home A Report on implementing the Ogiek Judgement in Kenya, May 2020, Nairobi, OPDP, MRG and Katiba Institute (eds.): pp 11ff (2020): 1-31

change impact on existing human security problems was “strongly disagree (0%), Disagree (0 %), Disagree nor Agree (22%), Agree (56%) and Strongly Agree (22%)”.

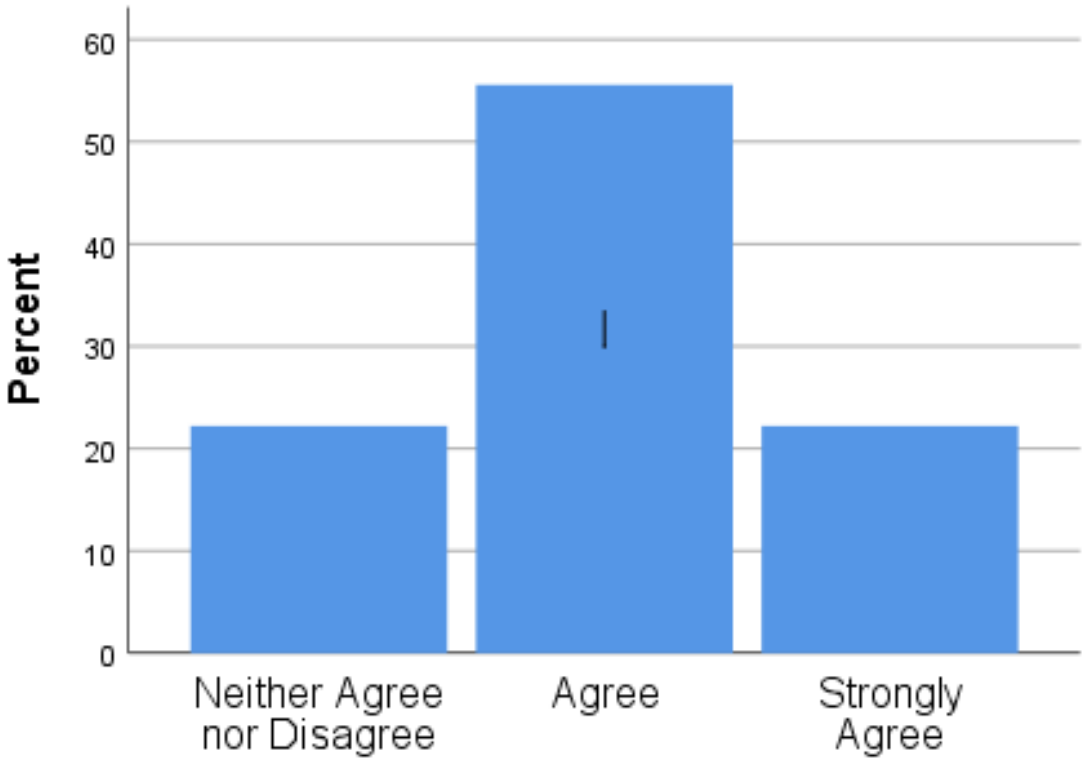

Figure 4.1: Climate Change Impact on Human Security problems in the World

The respondents who agreed and strongly agreed in regard to “climate change impact on human security problem, posited that climate change aggravates human security problems because it’s an influencing factor for food security, personal security, health security, water security and cultural security directly and indirectly”. Additionally, climate change for most of the respondents is interrelated and multi-faceted issue hence it will affect negatively the human security across the world.

According to the respondents the impact of climate change on human security problem will be most severe in the most vulnerable areas, i.e., those lacking expertise and financial resources to respond to existing problems. Further the respondents stated that climate change impact on human security problems in the vulnerable areas is likely to be more severe due to fragile living conditions in these areas. Thus, climate change is seen as both exacerbating factors intensifying resource and human security problems and acting as a catalyst for new environment and human security problems.

The respondents (22%) who neither agreed nor disagreed that climate change aggravates human security problems across the world largely consider climate change as a risk factor. According to these respondents' climate change in any region only increase human security problems when the tipping point is reached. The respondents noted that climate change only serves to exacerbate human security challenges as different regions near the tipping point and eclipse the point.

The rate of response on climate change as a risk factor to various systems as food, water, health, culture was "strongly disagreed (0%), Disagree (0 %), Disagree nor Agree (15%), Agree (63%) and Strongly Agree (22%)".

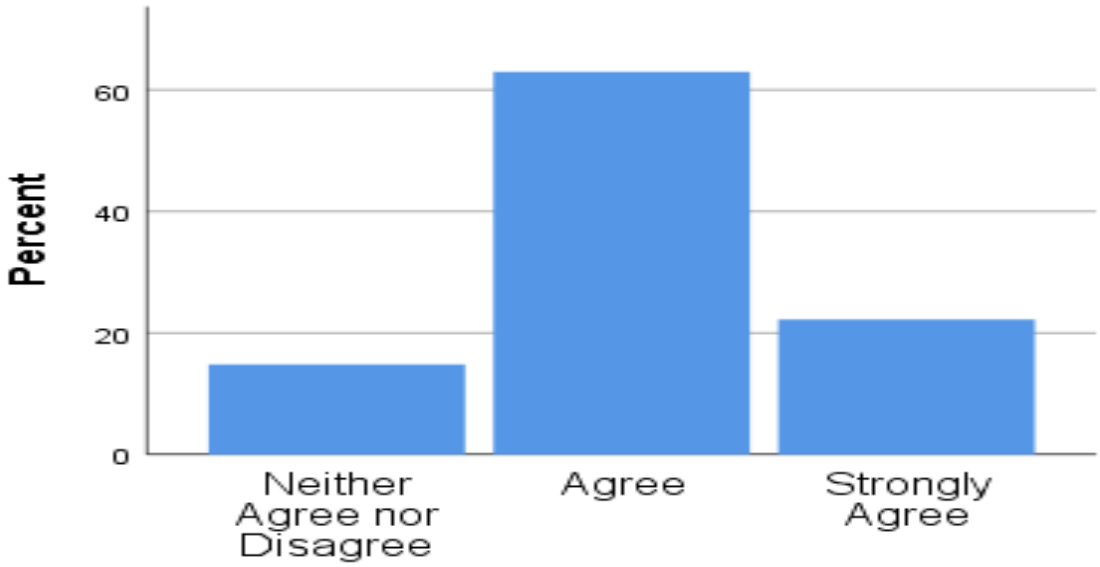

Figure 4.2: Climate Change Risk to Resource Systems in the World

The respondents insisted that climate change contributes to dwindling scarcity of resources such as food and water supplies that may trigger or exacerbate already existing human security challenges. Reserves. The availability of water according to the respondents underlies all human security elements thus impacting on various systems. Climate change was described as a human security threat for the reason that it increases the violation of people's human rights in different parts of the world.

4.6 Climate Change and Human Security in Africa

This section indicates the respondent views on the "nexus between climate change and human security in Africa". "This was examined through questions on climate change aggravation on existing human security problems in Africa and the climate change risks to water, food, health and

cultural systems in the continent". "Rate of response in regard to the climate change impact on existing human security problems was strongly disagree (0%), Disagree (0 %), Disagree nor Agree (14.8%), Agree (63%) and Strongly Agree (22.2%)".

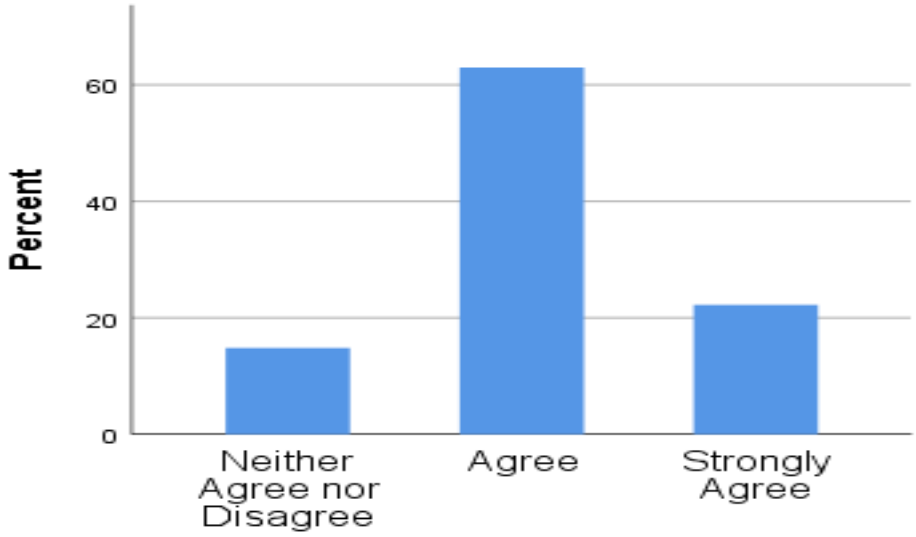

Figure 4.3: Climate Change Impact on Human Security problems in the World

The revealed that 63 percent of respondents agreed that climate change contributes to human security problems in Africa. "These respondents felt that climate change poses direct and indirect threats to food security, personal security, water security, health security and cultural security". "It has also been described as a threat multiplier that can intensify and prolong human insecurities in Africa". "Climate change is a threat multiplier to human security problems because it can accentuate situations of distress relating to scarcity of natural resources thus amplifying the problems".

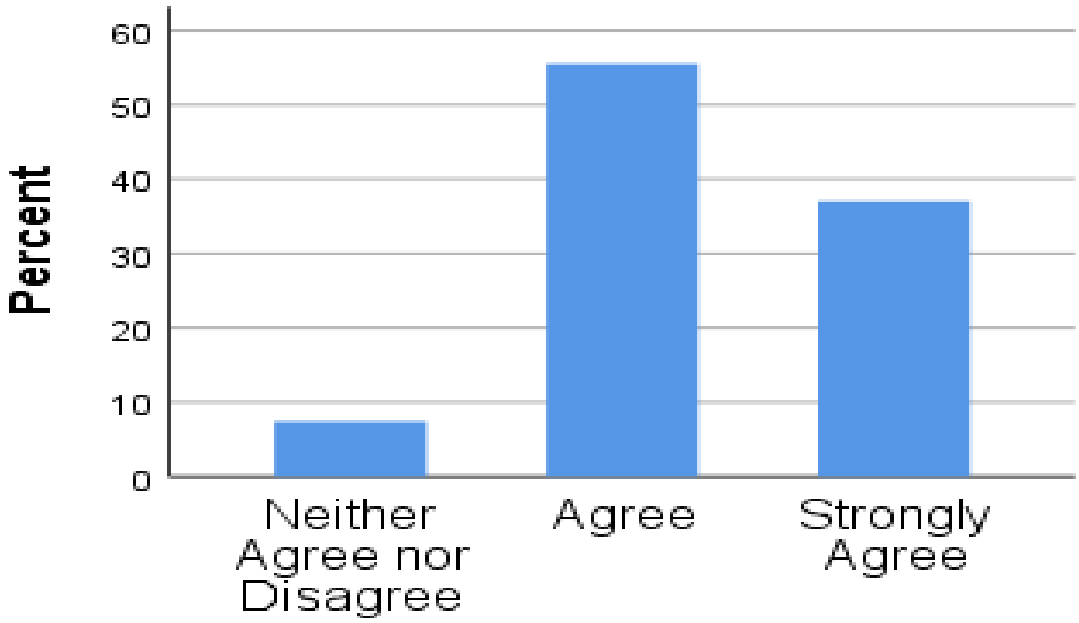

Figure 4.4: Climate Change Risk to Resource Systems in Africa

The rate of response in regard to impact of climate change risk to resource systems in Africa was "strongly disagree (0%), Disagree (0 %), Disagree nor Agree (7.5%), Agree (55.6%) and Strongly Agree (37%)". According to the respondents, most resource systems in Africa are fragile and vulnerable to variability of climate change and global warming. The fragility of these systems means that persons who are dependent on them are exposed to various climate risks and human insecurities. In Africa, "most water resources are declining as a result of drying-up rivers, flooding, drought, and inconsistencies in rainfall". "This is a severe problem as most nations are heavily dependent on rain for agriculture, water security and food security".

4.7 Conclusion

This chapter has discussed the climate change on human security in the international system, with a focus on Kenya. In the first part, the chapter analyzed the nexus between climate change and human security in Kenya. On this, the results shows that climate change only serves to worsen human security in Kenya. The second part examines how climate change affects different human securities in Kenya. Herein, the findings underscores that the impact of climate change is strongly felt on food security and water security but weakly felt on health security, personal security and cultural security. Climate change affects these health securities directly and indirectly.

This research has shown that climate Change contributes significantly to the rise of human security problems in Africa and beyond. The aggravation of human security problem is occasioned by dwindling scarcity of resources such as food and water supplies that may trigger or exacerbate already existing human security challenges in Africa and beyond. The fragility of resource systems in Africa compared to the reset of the world makes the persons who dependent on them more vulnerable to climate risks and human insecurities.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This is the final chapter of this study on the climate change and security nexus in Kenya. The utilized both primary and secondary data sources which were systematically analyzed and presented. The chapter presents a summary of the findings, conclusion and recommendations.

5.1 Summary of Findings

The first objective of the study was to "examine the Climate Change-Human Security Nexus in the 21st Century International System". In testing this objective, the study adopted the hypothesis that Climate change has led to human insecurity in the 21st century international system. The research builds on the existing framework that suggests that there is a strong interaction between climate and human insecurity; though these interactions are more pronounced on food security, water security and health security at the global level. times ancillary, they are meaningful and deserve further investigation. Empirical results of this study show that "there are both direct and indirect effects that increased climate change have on human insecurity dimensions in different regions of the world".

The second objective of the study assessed the impact of climate change on human security in Africa. This was guided by the hypothesis that climate change is a key driver of human insecurity in Africa. In line with the second objective, findings established that Climate change has led to human insecurity in various forms in Africa. Climate change is a major contributor on water and food insecurity in Lake Chad Basin (LCB). Local tensions and conflicts, rather than civil wars, are

established as outcomes linked to climate change and environmental degradation of resources in west Africa. The results show that these risks have also increased in other African societies. Increased contact and competition over scarce resources has also been witnessed in the region resulting to tensions and conflict over the resources.

The rapid-onset disasters such as floods, droughts and locus invasion has steadily led to deterioration of food security due to decline in production or destruction of crops in East Africa. Climate change may influence migratory movement amongst herders and pastoralists seeking for better livelihood options and resulting to cascading effect on livelihoods of farmers and entire communities. Water stress is increasing rapidly especially in East Africa due to climate change.

Climate variability in the southern African region has exacerbated food insecurity through decline in production due to floods and droughts in the region. Both directly and indirectly, climate change has led to worsening of health insecurities in the region through morbidity and mortality. Water availability and accessibility is increasingly becoming a challenge in the SADC region due to climate change. Climate change and climate variability in North Africa has led to more frequent and intense droughts in the region resulting to water insecurity and decline in agricultural productivity contributing to food insecurity. Climate change is also seen as a contributor to the tension in North Africa over the sharing and use of water bodies such as the River Nile.

Finally, the third objectivity of the study was to critically analyze the "impact of climate change on human security in Kenya". Climate change has a positive impact on human insecurity in Kenya. Further analysis revealed that climate change greatly contributes to water security and food

security in Kenya. However, climate change has a less impact on health insecurity, personal insecurity and cultural insecurity. Climate change-human insecurity pathways occur through scarcity of resources.

5.2 Conclusions

The researcher concludes that climate change scenarios impact on human security in low, moderate and severe risk areas in the world. Catastrophic impacts of climate change on human insecurities are felt in severe risk areas than moderate to low-risk areas across the world. The connections between climate change and human security were showed to be most significant on water security, food security and personal security in the international system. Based on the study findings, the researcher concludes that climate change is a key driver to human insecurity in Africa. The African continent is particularly vulnerable to climate change and thus worrying trends of droughts and floods will continue to lead to water insecurity, health insecurity, food insecurity, personal insecurity and cultural security. Climate change impacts is likely to worsen because of population pressure, resource scarcity and weak and fragile governments. Finally, the study concludes that climate security has led to scarcity of resources and human insecurity in Kenya. The analyses show that droughts and floods as climate change hazard results in resource scarcity which threatens to destabilize security environments in communities across the country.

5.3 Recommendations

The researcher recommends that the international community should ramp up their efforts in mitigating the risks associated with climate change by quickly reducing and phasing out global greenhouse gas emissions. This will require that the international community work earnest towards

achieving net-zero global emissions in a manner that is ambitious, safe, equitable, and well-governed.

The researcher recommends that climate security nexus should be incorporated into development, security and diplomacy activities. This will allow Kenya align its national climate change action plan holistically. Currently, the national climate change action plan 2018-2022 exclude diplomatic activities in climate change adaptation and mitigation in Kenya. Although few counties have developed their climate change action plan the study recommends that other counties should follow suit and develop their specific climate change adaptation policies to address the potential impact of climate change in counties.

The researcher recommends that African union in conjunction with united nations should develop climate security activities in different regional blocks as an important preventative approach to address climate-security risks in Africa. The researcher also recommends that the various regional blocks such as EAC, ECOWAS and SADC should strengthen their climate security activities at regional level in mitigating the risk of climate related hazards.

5.4 Suggestions for Further Studies

The researcher suggests that further studies on the impact of climate change scenarios should be carried out in various regional blocking to compare and contrast the climate change impacts across the Africa. The researcher suggests that a study on climate change and their impact on other human security not dealt with in this study should be explored further. The study suggests that more studies should be carried out on international and regional response to climate change in Africa with a view to understanding international relations over the same in Africa.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE SCHEDULE

This questionnaire aims at collecting data for the research on the impact of climate change on human security in Kenya. The research is part of my study requirements for the award of master's degree in diplomacy and international relations studies at the University of Nairobi, Kenya. Information you provide will be handled with due confidentiality and shall valued as part of my research work. Kindly tick (fill in) where appropriate

1. Gender of the respondent

   Male ( )

   Female ( )

2. Highest completed level of education

   Diploma Level ( ) Bachelors Degree ( ) Masters Degree / Post graduate Diploma ( ) Phd level of Education

3. How long have you worked on climate changed issues?

   1 - 5 years ( ) 6 - 10 years ( ) 11 – 15 years ( ) 16 – 20 years ( ) Over 21 years ( )

4. I am a member of ……. Civil societies ( ) UNEP ( ) Government ( )

SECTION B: Climate Change in Kenya

To what extent do you agree with the following statements with regards to climate change in Kenya? Tick where appropriate using the following scale: 1 = strongly disagree 2 = Disagree 3= Neither agree nor disagree 4= Agree, 5 = Agree strongly

Statement	**1**	**2**	**3**	**4**	**5**
Knowledge/ Awareness on Climate Change					

Climate change has resulted to fluctuation in earth's temperatures in Kenya					
Climate change has resulted to increase in current atmospheric concentrations of carbon dioxide (CO2) in Kenya					
Severe and prolonged droughts are a common in Kenya					
Severe floods are common in Kenya					
The pattern of weather in Kenya is generally changing					
Causes of Climate Change					
Human activity is responsible for climate change					
Deforestation is one of the main causes of climate change					
Developed countries such as United States and China take most of the blame for climate change					
Natural changes in the environment are responsible for climate change					
Agricultural, such as methane from livestock and manure and nitrous oxide emissions from fertilizers is a major contributor to climate change					
Carbon emissions from vehicles and large businesses are major contributor to climate change					

Climate Change and Human Security in Africa and the World

To what extent do you agree with the following statements with regards to climate change and human security nexus in Africa and beyond? Tick where appropriate using the following scale: 1 = Strongly Disagree 2 = Disagree 3= Neutral 4= Agree 5 = Strongly Agree

1. Climate change has aggravated existing human security problems in different regions of the world.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

2. Climate change poses increased risk to water, food, health and cultural systems across the world.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

3. Climate change has aggravated existing human security problems in different parts of Africa.

[ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

4. Climate change poses increased risk to water, food, health and cultural systems across the world.

SECTION D: CLIMATE CHANGE AND HUMAN SECURITY IN THE KENYA

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

Statements	**1**	**2**	**3**	**4**	**5**
Effects of Climate Change on Food Security					
Climate change has decreased sufficient food availability is Kenya					
Disruption or loss of livelihoods due to climate change has reduced sufficient access to food to the poor and vulnerable in Kenya					
Climate change has affected the quantity, variety and quality of food that households consume in Kenya.					
Effects of Climate Change on Health Security					
Climate change induced mortality occasioned by floods and droughts has increased in Kenya					
Climate change has led to rise of disease-causing vector pathogens/microbes exposing citizens to various health risks					

Loss of livelihoods due to climate change has increased mental disorder burden in the country					
Effects of Climate Change on Conflict and Personal Security					
Climate change has led to increased conflict due to increased water scarcity					
Climate change has led to increased conflict due to difficulties in accessing food					
Climate change has led to rise of Agro-pastoral conflicts in Kenya					
Effect of Climate Change on Water Security					
Climate change has resulted to less water than enough becoming available to residents in Kenya					
Climate change has led to availability of poor water quality for most residents in Kenya					
Climate change has led to less water than enough becoming accessible during rainy seasons					
Effect of Climate Change on Cultural Security					
Climate-induced migration has led disappearance of some culture among indigenous communities in Kenya					
Forced migration due to climate change has led disappearance of some indigenous communities in Kenya					
Climate changes causes mechanical degradation to the cultural heritage buildings in Kenya					

APPENDIX II: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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APPENDIX III: ANTIPLAGIARISM REPORT

PROJECT

ORIGINALITY REPORT

15%	11%	10%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	new.esp.org Internet Source	1%
2	Handbook of Climate Change Adaptation, 2015. Publication	1%
3	www.gradebirdie.com Internet Source	1%
4	www.tandfonline.com Internet Source	1%
5	"Climate Change Adaptation, Resilience and Hazards", Springer Science and Business Media LLC, 2016 Publication	<1%
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